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Christmas 1963

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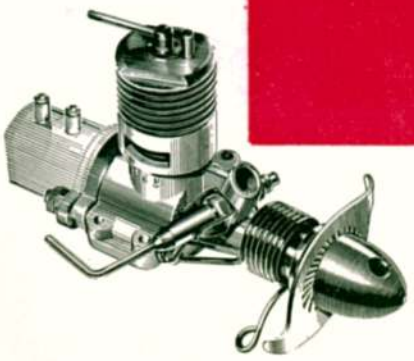

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AERO MODELLER

MAP HOBBY MAGAZINE

other modelling angles . . .

"Radio Control Models & Electronics" special Christmas issue contains two fu'l-size FREE plans. One is a really simple single channel aircraft named the **Twophin,** suitable for .5 to .8 c.c. engines, and the other is an unusual catamaran boat named the **Tom-Tom** for electric or diesel propulsion. Full supporting artic'es describe the construction and installation of the radio gear. Control systems used are the simplest imaginable, and small commercial receivers may be used. For those who wish to make their own radio equipment, a beginners' transmitter using an all-transistorised circuit which is both easy to construct and reasonab'y cheap compared with a ready built article is described. Thus the issue of R.C.M. & E. provides a complete and practical "First-off" single channel course. The popular "Basic for Beginners" article explains still more of the details connected with single channel radio (the beginners' choice), in fact this is an issue full of encouragement to those starting R/C. The experts have not been forgotten, and continuations of the "Podlaski Superhet" and "Super Proportional System" contain constructional details.

"Model Maker & Model Cars" also has a full-size plan—FREE in every copy —for a neat and simple little **Whale Catcher** designed by "Marine Miniatures" man, R. A. Sweet. Other fine features include one on Hydrofoils; H.M.S. Diamond and H.M.S. Hogue; Full details of the European Championships for model boats run at Nuremburg and another British Warships instalment. Car fans will be able to enjoy details of the Rover B.R.M., the Speedwell G.T. Sprite conversion, Lap recorders, Dynamic braking and the Mercedes W25.

December 1963

VOLUME XXVIII No. 335

contents

cover

F. G. Longbon and his one-sixth replica of the "British Pou," the Abbott-Baynes version with extended forward wing and Carden-Ford engine. Details of this 44 in. scale model for 1-1.5 c.c. will be found in pages 600-602 of this issue.

next month . . .

A true Champions issue, with dimensional drawings of Erno Frigyes' Power winner and Joachim Loffler's winning Wakefield plus all the Champions' airfoils —and a survey of single-line control handles from the Criterium of Aces. An Aeromodeller's simple to make field tool box ; **Coriolis,** a simple and very successful A/2 glider ; another retractable undercarriage (for the A.P.S. **Dakota**) and engine analysis of the new **ZA-92** diesel support a bevy of other fine features we are preparing. Full-size plan of the month is a perfect job for the clubroom or small lawn. John Simmance's 22 in. scale **Fokker Eindekker** for electric R.T.P. or small engine C/L flying—sure to be a favourite. Out on December 20th, price 2s.

Editorial and Advertisement offices

38 Clarendon Road, Watford, Herts

Telephone: **Watford 32351** *(Mon.-Fri.)*

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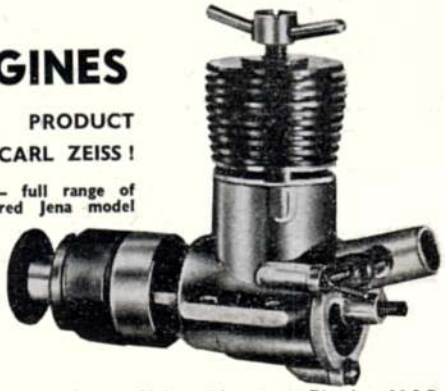

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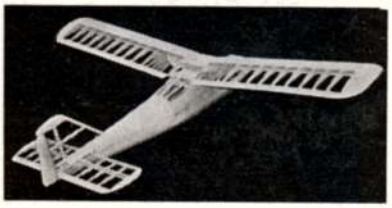

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HEARD AT THE HANGAR DOORS

Brazilian Circuit

Heading photograph illustrates the magnificent pair of control line circuits recently opened by Governor Carlos Lacerda in Burle Max Gardens, near the centre of Rio de Janeiro, Brazil. The opening ceremony on August 25th concluded an expenditure of £12,000 invested by the Government in the preparation of this magnificent centre for control line flying.

How wonderful it would be if the London County Council could be persuaded to produce similar facilities in London's Hyde Park!

Still a Champion

Renowned for his aeromodelling prowess as a World Champion in the A/2 class, Rudi Lindner of Germany has now added further fame to his reputation in the full-size gliding world following a long distance flight made on June 2nd. The flight covered a distance of 543.7 miles from Stuttgart in Germany to Saint Nazaire in France. This beats the previous record for distance by about 10 miles. Rudi was piloting a *Phoenix* glider and the remarkable side to this record was that the flight was made in the company of two KA-6 gliders, flown by Otto Schauble and Karl Betzler. Pilots maintained radio contact and followed each other from thermal to thermal. Gliding is a "natural" associated hobby with aeromodelling—we wonder how much Rudi owes to his modelling experience for his prowess as a full-size glider pilot.

Record Distance Attempt

On the opposite side of the globe, during the merry month of June, New Zealand modeller, Ross Ferris, made an attempt to establish a New Zealand record for radio controlled distance flying. The model was a modified *Smog Hog* weighing 4½ lbs., fitted with an Oliver Tiger Mark III and a much enlarged fibre glass baffled 12 oz. tank, which fed a small float chamber made by John Malkin. Radio equipment was the new lightweight gear by Les Wright. Plans had to be rapidly changed when a northerly breeze enforced a decision to fly in the opposite direction to that planned, but the model was finally launched near Masterton, and chased by car and transmitter through to the landing 40 minutes later at Featherstone. Frequent stops had to be made to spin off excess altitude and get the model back on course. There were moments of nervous tension when the model was obscured from view, including one exciting point when a stiff breeze brought with it severe turbulence and Ross had a battle to control the model from the centre of Featherstone main street, in front of mystified churchgoers. A record claim has been made through the N.Z.A.M.A. and we understand from a New Zealander that the distance is in the region of 20 miles.

Specialists

Of the many club newsletters received at our offices and which help to keep us in touch with club activities in all corners of the aeromodelling world, there are some which specialise in particular subjects and benefit through world wide circulation of ideas.

Indoor News and Views, is produced as the "Voice of the National Indoor Model Airplane Society" by Bud Tenny with a subscription rate of $2 per year from

The Editor and staff send Christmas greetings and best wishes for a prosperous New Year to all readers

Box 545, Richardson, Texas. Issued monthly and neatly printed by offset process, covering an average of five pages per issue, this bulletin gives all news of latest indoor model developments in the U.S.A. and summarises news from around the world.

Flying Scale News and Views is produced as the newsletter for the Flitemasters, Inglewood, California, but is open for international circulation with a subscription rate of $2 a year through the secretary, Russ Barrera, 1200 Strand, Manhattan Beach, California. This is a seven page duplicated bulletin giving hints and tips such as cockpit furnishing, contest information, news from around the world and a "Buy, Sell, Swop" section. This is a fine medium for interchange of flying scale ideas among the specialists.

Zephyr, deals entirely with slope soaring models and comes from the Harbor Slope Soaring Society in California. The editor is Dale Willoughby of 14695 Candeda Place, Tustin, California, and membership rate of the Society is $5 per year, but this includes authority to use their slope soaring site. The paper is aimed at radio control soaring, a subject which is rapidly gaining increased interest.

The British Plastic Modellers Society newsheet No. 1 has just been published following the inaugural meeting in July and is a seven page duplicated newsletter dealing with latest models, books and sources of information, hints and tips and correspondence concerning plastic scale models. It is a condition of membership that the applicant must have completed at least three plastic models and subscription rates are 10s. 6d. up to 16 years, £1 1s. for over that age, up to 21, and £2 2s. per annum for full seniors. The object of the Society is to provide a comprehensive advisory service and to aid fellow modellers in every way possible. The secretary may be contacted at 145 Camberwell Road, London, S.E.5.

Retirement

After 20 years of service with the Academy of Model Aeronautics, U.S.A., Russ Nichols retired from office as Executive Director on June 30th. During that time Russ had seen the A.M.A. grow in stature and had considerably aided the progress of aeromodelling as an organised youth activity. His co-operation with the United States Navy brought the arrangement for the very successful annual National Championships in particular, the Navy provision of airfield accommodation and also judges and timekeepers on each occasion.

Russ' efforts were much respected, both in his own country and overseas, we all wish him a very happy retirement after his long service.

"George—Just 'what' did you cover that 'Pal Joey' with ? ? ?"

New British Records

Recently ratified by the S.M.A.E. was an assortment of new records. Barry Purslow now holds the slope soaring duration record at 4 hours 17:36 (see photo page 572 last month). Flt. Lt. Ralph Gould established a new record for jet speed at 156.4 m.p.h. during the Northern Gala. On 1st September the Hayes team of A. Dell and D. Balch established a ½A team race record time of 8:31.8 for the 10 mile distance and two weeks later on 15th September the R. Place/A. Burley team established two new F.A.I. records, 4 : 16.5 for 10 kilometres and 9 : 07 for 20 kilometres, plus a new ½A record of 8 : 28. Then on 13th October Arthur Barr of Coventry established a new class 2 indoor microfilm record of 25 : 36.

Reduced Entry Fees

As of 1st January 1964 S.M.A.E. contest entry fees will revert to the earlier figure of 1s. 6d. per preentry. Late entries at double rate will then be 3s., thus reducing the deterrent for production of entries on the field in area centralised meetings. The economy is unlikely to affect S.M.A.E. finances.

S.M.A.E. Strength

Figures were issued on 22nd October by the S.M.A.E. declaring the strength of the Society as follows. Full members 2,200, country members 450, associates 3,050 and the total number of clubs with affiliated membership of the Society, 247. The last figure makes an interesting comparison with our own survey arising out of the readers' survey made during the year. This provided us with the addresses of 225 clubs with affiliation to the S.M.A.E. plus another 95 organised clubs who remain unaffiliated. Whichever way one looks at these figures, it is obvious that there has been a steady decline in club activity over the past few years—at one time it was firmly established that there were 600 aeromodelling clubs active within the British Isles.

Champion Nation?

That very lively newsletter *The Airfoil* produced by the Balsa Beavers M.F.C., Toronto, Canada, brings to light an interesting championship table arising out of the 1963 World Championship for free flight models. By totalling the team performances in the power, wakefield and A/2 glider events, one achieves the gross duration in seconds performed by the national team. Maximum possible is 8,100. Clear leaders with 7,519 secs were the Italian team, followed by Holland 7,242, West Germany 7,162, Czechoslovakia 7,048. Then comes Canada at 6,977 (hence the "Airfoil" investigation), followed by Yugoslavia 6,924, Great Britain (Hooray!) 6,919, East Germany 6,870, U.S.A. 6,833, Sweden 6,787, Finland 6,580, France 6,551, the host nation, Austria 6,446 and New Zealand 6,300. Some nations, the U.S.S.R. and Hungary included did not field full teams and thus are not listed.

Plane on the Cover!

F. G. LONGBON'S 44 in. span, one sixth true scale model for 1 c.c.-1.5 c.c. engines of the famous home-built

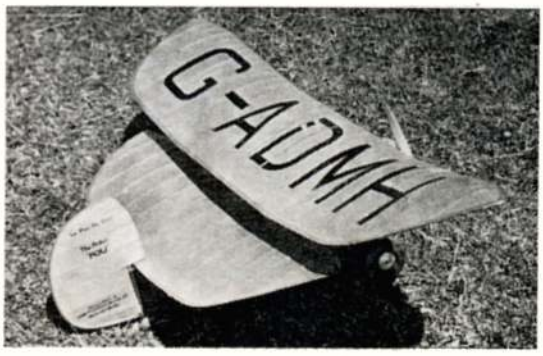
CARDEN-BAYNES 'FLYING FLEA'

OF ALL THE challenging subjects for flying scale models, Henri Mignet's "Pou du Ciel" *Flying Flea* has been the one which has probably defeated more modellers than any other subject (the *de Havilland* 5 probably runs it a close second).

Side elevation emphasises the realism of this scale "Flea" nestling in short grass at R.A.F. Halton. Note true scale wing section.

Imagine our pleasant surprise, therefore, to see on that sunny summery day with which the Northern Heights Flying Club is usually blessed for their annual gala at R.A.F. Halton, Bucks, a beautiful example of the Flea performing just like the full-size. Investigation proved that this was, in fact, quite an old model being aired after a period of storage and display in a model shop. It is a veteran flyer which has been built with various wing sections and which, we can assure all readers, is beautifully stable in the version as drawn.

No need for the pilot to get wet in the "Flea". Tandem wing arrangement gives a safety slot effect, making the "Flea" difficult to stall. This model is a very gentle flyer.



We watched several flights by veteran scale modeller F. G. Longbon at Halton, took the cover photo and entered discussion for these plans. When the model was produced, Mr. Longbon did not have access to the material we were able to gather for the September '63 Aircraft Described feature and so there are some subtle differences which have been introduced in the preparation of the A.P.S. drawing for the sake of specific accuracy. They do not in any way effect flying trim but add to the authenticity.

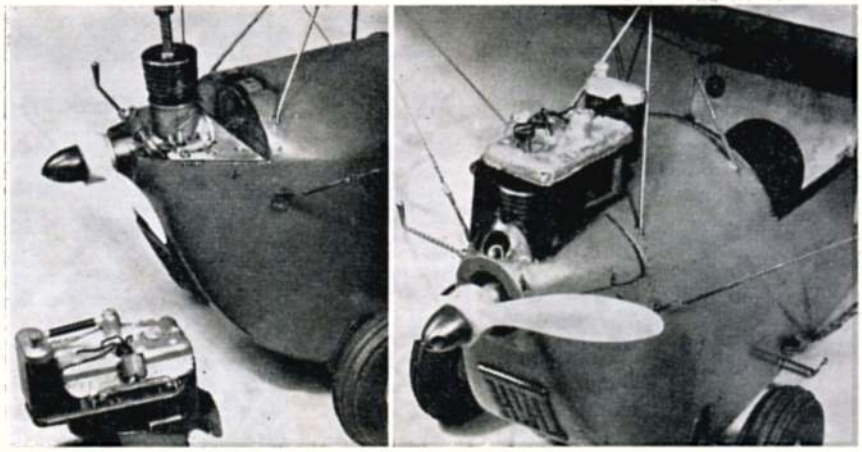
Incidentally, the colouring on the cover is not quite correct, the aircraft should be all silver (if to be registered G-ADMH) with letters in black outline. Nevertheless, this Flea makes a very pretty picture as all will agree and to see its tandem wings droning round in calm evening air is a sight to admire. Construction closely follows that of the full-size wherever possible and because the designer's building notes incorporate many interesting tricks of the trade born from the long experience of Mr. Longbon, we are reprinting his building notes in full here, rather than issue them separately and only to plans purchasers. Many hints and tips on flying scale modelling can be picked up by study of the plan reproduction and these building notes.

The fuselage is the first item for construction, beginning with cutting out medium hard $\frac{1}{32}$ in. sheet fuselage sides and marking positions of formers F.3 to F.7. Cement $\frac{1}{8}$ in. sheet doublers to sides; add $\frac{1}{8}$ in. square longerons, short $\frac{1}{8}$ in. sill and place both prepared sides under suitable weights to dry. Cut all formers from $\frac{1}{8}$ in. sheet except F1. Back and face with 1 mm. ply on F.2, F.3, F.4, and F.5, to reinforce for sewing the pylon wing mount, and bend front pylon from 16 s.w.g. wire to shape and sew firmly to former 2; rear pylon is 14 s.w.g. and sewn firmly and well cemented to F.4.

The rear main wing support is also 14 s.w.g. sewn to F.5, Upper ends are bound and soldered.

To erect the fuselage, lay one side flat on board and glue formers 4 & 5 in place, using a set square to ensure they are vertical; when completely dry, add the other side and leave to thoroughly dry.

Bring fuselage ends together, insert shaped block at stern, glue and clip and add formers 3, 6 and 7. Insert $\frac{3}{8}$ in. by $\frac{1}{2}$ in. bearers into F.3 and F.4; cut main undercarriage axle from 10 s.w.g. wire and sew with heavy thread through former 3, secure with Araldite.



Nose details at right of F. G. Longbon's prototype installation of the D.C. Spitfire shows how the dummy Carden Ford engine shrouds the 1 c.c. diesel cylinder and yet is completely detachable for general access. Our plan carries minor detail mods for the sake of accuracy with slight revision to engine arrangement.

FULL-SIZE COPIES OF THE 1/8th SCALE PLAN REPRODUCTION BELOW ARE AVAILABLE FROM AEROMODELLER PLANS SERVICE PRICE 9s., INCLUDING POST. PLEASE QUOTE PLAN NUMBER FSP.853 WHEN ORDERING.

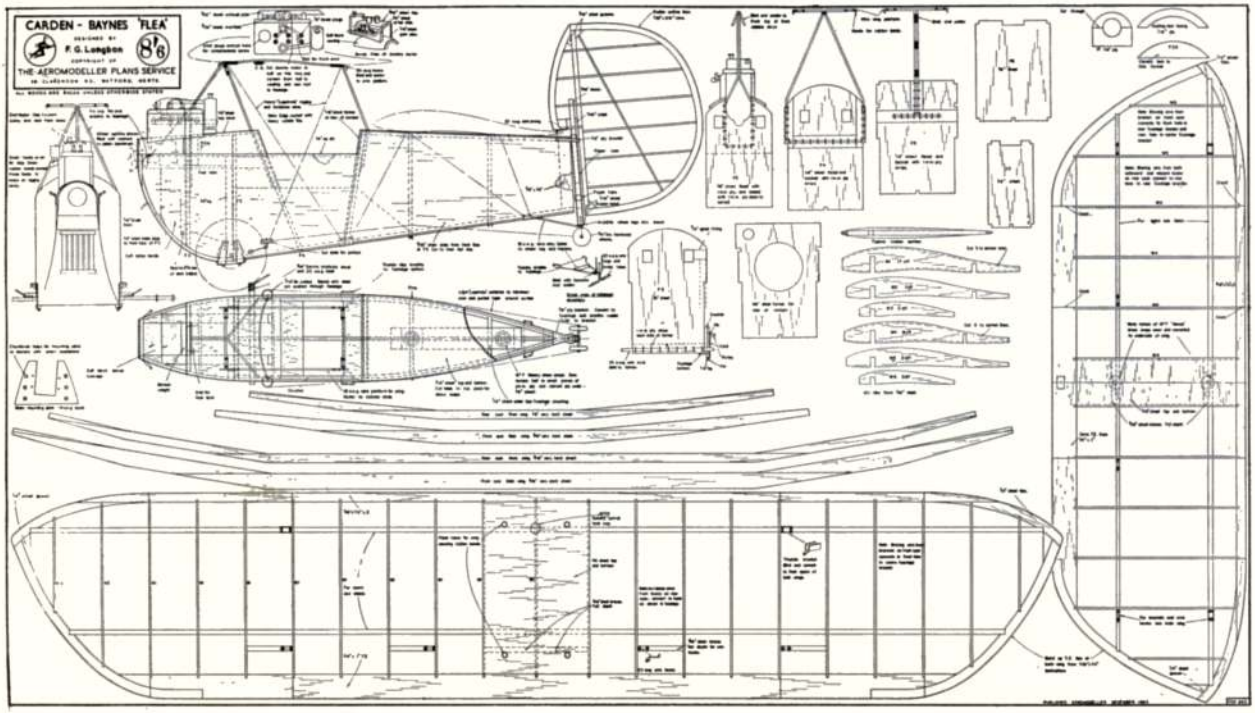
Thread former F.2 on to engine bearers in correct position and cement securely. When dry, bring together tops of front pylon, bind and solder.

Cement lengths of $\frac{1}{4}$ sq. to front of F.3, $\frac{1}{32}$ in from edge, add pieces of $\frac{1}{8}$ in. sheet to bearers between F.2 and F.3, and F.2 to front ends of bearers and carve to shape of plan view of nose. Lower cowling sides at nose are hard $\frac{1}{8}$ in. sheet, carefully fitted and glued, grain running vertical. At this stage, ballast can be fitted to F.2. This was approximately $2\frac{1}{2}$ oz. lead on original model and was cast in a small wooden box (balsa), drilled, screwed and glued to F.3 with Araldite. (With engines of 1 cc. capacity weighing from $2\frac{1}{2}$ to $2\frac{3}{4}$ ozs. this amount of ballast will be about correct). (*i.e.*, Davies-Charlton "Spitfire", M.E. "Heron", ZA-92, etc).

Bottom of fuselage between F.2 and F.3 is filled with a piece of soft 1 in. sheet, and between sides of nose and former F.2 with a soft block, carved to lower nose contour. $\frac{1}{8}$ in. sheet is glued over this and trimmed to final shape. Nose former F1 is a $\frac{1}{16}$ in. ply ring glued to the front of the fuselage and top cowl, parted on centre line.

Top of fuselage from F.2 to F.4 is planked with $\frac{1}{8}$ in. sheet. Removable cowling is carved from soft block (or planked with main fuselage top and cut away). A dummy Carden-Ford engine is made and glued in place. (It will be best to mount the diesel motor in position and build the engine around.

Rear wing fixing is a $\frac{1}{8}$ in. hard sheet balsa plate, two female halves of No. 7 dress snaps are sewn to small pieces of 1 mm. ply, sheet balsa plate is punched to receive snaps, and ply, complete with snaps, are glued in place, plate is then let into tops of formers 6 and 7 as shown, and well cemented. Top of rear fuselage is then covered with $\frac{1}{16}$ in. sheet (cutting holes to fit over dress snaps). Top of snaps must be flush with the sheet. Main wing platform is bent up from 16 g. wire and shaped to conform to the under-camber of wing, bound and soldered to 14 s.w.g. wing pylon. 20 gauge hooks are bent and soldered to the platform.



Caught in flight, the "Flea" model is positively unmistakable in the air and remarkably stable. The tandem wing arrangement provides excellent stability, but there are limitations to amount of power used. This design is recommended for 1 to 1.5 c.c. maximum. Photo bottom right shows tail markings with a glimpse of triple cockpit instruments. Note also the tandem tail wheel.

Rudder post is made from paper or celluloid tube to fit $\frac{3}{16}$ in. dowel, doped to stiffen and fixed to top of fuselage at stern by a shaped $\frac{1}{8}$ in. ply bracket, glued with Araldite. Lower end is anchored by a tinplate bracket (which also forms fixing lugs for rear wing bracing wires). From this bracket runs a soldered 18 g. wire brace looped around tail wheel axle pivot, which in turn is pushed into a length of $\frac{3}{16}$ in. dowel. Araldited and glued into lower end of tube.

Tail wheels are $\frac{3}{4}$ in. dia. ; faired to streamline section and bushed with 20 g. brass tube. Bottom of fuselage has a $\frac{1}{8}$ in. sq. stringer let in along centre line and is covered with $\frac{1}{16}$ in. sheet, grain running across fuselage for strength and realism.

The typical "Pou" rudder outline which varied so much is laminated $\frac{3}{16}$ in. x $\frac{1}{32}$ in. strip bent around pins in the drawing outline and glued with P.V.A. glue ; spar from $\frac{3}{16}$ in. sq. and ribs are $\frac{3}{16}$ in. x $\frac{1}{16}$ in. let into the outline and capped each side of spar by lengths of $\frac{1}{8}$ in. x $\frac{1}{16}$ in. on edge, being sanded to an aerofoil section when dry. Rudder fixes to fuselage by means of an $\frac{3}{16}$ in. dowel pushed into tube at end of fuselage. A small wire prong at front of rudder stops any unwanted movement. An extra $\frac{1}{16}$ in. sheet former is cut to shape of F.5, two holes are cut in this, and the former is glued to the face of F.5 (these holes are a feature of the "Flea").

Main wing spars of hard $\frac{3}{16}$ in. sheet balsa, and leading edge of $\frac{3}{8}$ in. x $\frac{1}{2}$ in. are of identical shapes, built up over plan and securely cemented. Pin down spars; and leading edge after slotting and packing up with scrap to allow for undercamber. Trailing edge is slotted and packed underneath to allow for reflex camber. Spars are notched and now W1 central ribs are let into them. When centre portion of main wing is dry, tilt until outer lengths of spars, leading edge and trailing edge are lying flat on plan. Cut partly through trailing edge, crack, glue well, pack up again and add remainder of W1 ribs. When dry, tilt wing once again on to tip portion, shape end of trailing edge to receive tip and build up laminated T.E. tip from $\frac{1}{4}$ in. x $\frac{1}{32}$ in. strips, glueing thoroughly with P.V.A. glue. Add L.E. tip of $\frac{1}{2}$ in. sheet and join to laminated T.E. with gusset. Then add ribs W2, W3, repeat for other tip. Centre two bays are covered in $\frac{1}{16}$ in. sheet and paper tubes rolled and added. Whole wing is then carefully carved and sanded to shape. Be meticulous with this, much depends on a pleasing wing contour.

Secondary wing is made in exactly the same manner. Scrap pieces of $\frac{3}{16}$ in. sheet are added in between ribs at centre and male halves of No. 7 dress snaps are sewn and cemented in place. Tinplate lugs are bent and glued with Araldite to the structure where shown on both wings, and 20 g. wire hooks are also bent and bound and glued where shown. Tinplate lugs are also cut and bent and glued with Araldite to fuselage where shown to take bracing wires. For extra strength these lugs are pierced and fine steel pins are pushed through lugs.

Cover wings, fuselage and rudder with silk or nylon, dope well (four coats on original), and fit dummy pulleys and incidence control rod. Dummy pulleys are made from $\frac{1}{16}$ in. ply flanges with a $\frac{1}{16}$ in. ply core, drilled and a length of 20 g. wire is pushed through pulley, bent at each end and fixed to fuselage after cutting slots in fuselage sides.

The dummy incidence control rod (to actuate main wing on full-size) is $\frac{3}{16}$ in. dowel with 20 g. wire each end inserted through fuselage and glued. Lightweight Laystrate is threaded through fuselage round each pulley, soldered to one side of tail wheel axle, pulled fairly tightly and soldered to end of axle.

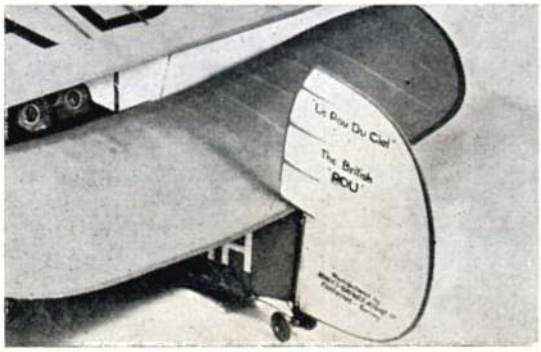
Original model was finished with red fuselage and silver wings and rudder as on the cover. A length of rubber insulation is slit and stuck around front of cockpit. Fit a dummy instrument panel and make engine mounting plate from 14 g. dural or plywood ; bolt engine to the plate and secure plate to bearers with screws.

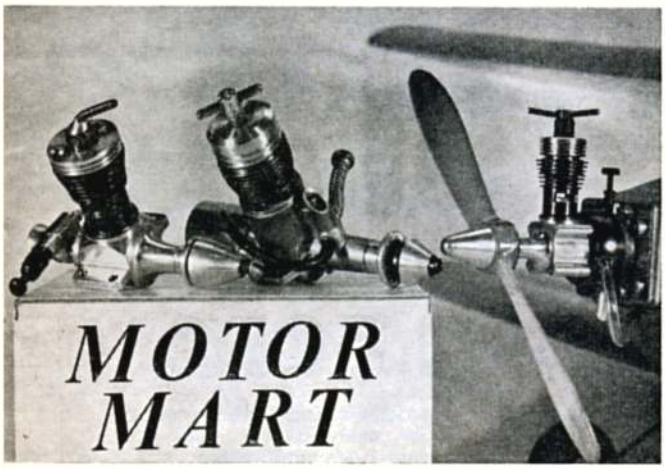
Flying, lift and incidence control wires are of heavy Laystrate wire, and tensioned with small rubber bands. Wheels were originally made from ply and balsa, but were replaced with $2\frac{3}{4}$ dia. Graupner Balloon wheels.

Flying this model presents no difficulty providing the angle of incidence of the wing is correct and the right amount of downthrust and sidethrust is incorporated. Trim for a good flat glide and carry out all preliminary power flights on low revs increasing until the model flies safely in wide *left*-hand circles. Do not attempt to over-power, this is not a fighter! The sports type diesel is ideal for the "Pou".

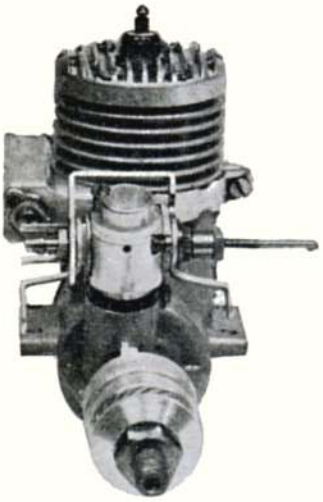
If the model should stall on transition from power to glide, a small piece of packing can be inserted between lower surface of main wing and upper side of wing mount at the *trailing edge*. Even though the model is rather heavy at approximately 28 ozs., the glide is slow, flat and perfectly safe. It looks very attractive in the air and should repay careful construction and trimming with very good flights, pulling itself through gust induced bothers just like the full-size Flea.

Good luck and happy landings!





At left: the diesel conversions of Cox Space Hopper, Fox .07 and Cox Pee Wee .020 glow plug engines by Bert Striegler in the U.S.A. All operate well, using dural control-pistons and cylinder heads. Right, frontal aspect of Super Tigre G21/40 illustrates the offset front rotary valve intake. This offers better shaft contruction for balance. Latest type S-T throttle is fitted on this almost 7 c.c. Italian glow plug engine, available in standard lapped piston form at £7 3s. 6d. and with ringed piston at £7 19s. 6d., distributed by H. Brooks ("Soraco").



Above: Taipan 1.5D shows replaceable shaft saving prop bolt and stout crankcase for beginner operation.

Above: new ZA 92 with angled needle, extended mounting lugs. Head and tank are anodized red. Below, Wen-Mac 049 'Hot Shot' as fitted to Wen-Mac ready-to-fly combat wings.

BERT C. STRIEGLER, who will be best remembered for his widely copied "Ebeneezer" sport flyer, is a modeller who likes to experiment, as can be seen in the heading photo. **Diesel conversion** of the Cox Space Hopper, Fox .07 and Cox Pee Wee with dural heads and contra pistons has provided excellent results. The .02 Pee Wee now drives a larger prop, as can be seen but has the characteristic that it simply will not start unless it can be choked. Consequently, the intake now has an extension. Such conversions are not always successful. Glow plug engines are designed for lighter bearing loads and have bigger ports. Bert states that all three of his engines consume enormous quantities of fuel.

The Australian company, **Gordon Burford and Co.** have now added two sport engines to their range and tell us that the new "1.5 c.c. Taipan" glow and diesel types out-sell all their other engine sizes. The "Taipan 1.5D" we have checked is exactly what the makers' claim, an ideal beginners engine. Robustly constructed and with a very wide rev range from 5,250 on 10 in. x 6 in. to 11,000 on a 7 in. x 4 in., it starts easily and is specifically designed to withstand rough handling. Combination radial and beam mounting is a crankcase feature and the 'over-square' engine (.511 bore, .453 stroke) is entirely produced on automatic lathes with electronic equipment used to gauge honing of the cylinder and to mate the piston to the particular bore. The engine retails at the low figure of 69s. 6d. in Australia, equivalent to 53s. Sterling and comes complete with metal tank.

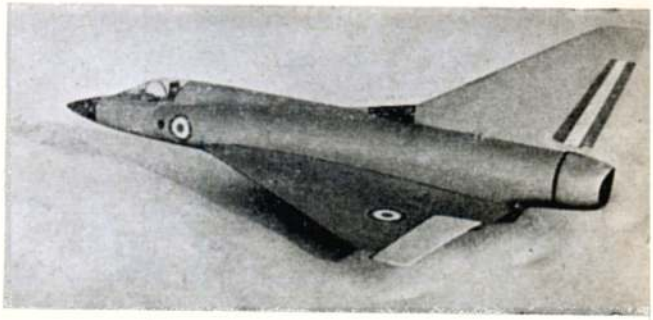
Similar in many respects, except for its smaller capacity of .922 c.c. is the new "ZA 92" by **De-Za-Lux.** This retails at a most moderate 49s. 2d. and, as mentioned last month, turns 9,750 on a 7 in. x 4 in. A feature is the main shaft bearing of manganese bronze, carefully mated to give best crankcase seal at lightest frictional loading, and a non-sensitive needle valve adjustment. The Company is attentive to modellers demands and has already extended the engine bearers and angled the needle valve in response to requests. Additionally, a marine version, complete with fly-wheel and internal space saving ball joint ready for 4BA prop shafts, will soon be available at 75s. 2d. The "ZA 92" should develop into a very popular sport motor.

We have also had an opportunity of seeing the two latest products from America, the **Wen-Mac** "Hot Shot" or Mark V version of the 049. This sells at 47s. 6d. complete with prop and the Wen-Mac automatic return enclosed spring starter. Comparison with earlier motors immediately displays the extended length of the cylinder and shortened crankcase, while internal mods. have brought about an overall improvement in performance.

From **Cox,** we have samples of the three throttle control units for .049, .09 and .15 engines. As now expected of this high standard Company, the units fit with precision and convert the Medallion series into first class engines for radio control. Simple push-pull slide action restricts both exhaust and intake, cleverly coupled to give a 4 to 12,000 rev range on the .049 without fear of cutting out. Minor adjustment of slow running is possible through shim washers provided. The control units retail at 38s. 6d., 42s. 6d. and 47s. 3d. respectively—prices which reflect upon the quality of the involved castings and the effect of their performance.

2 c.c. is a size of engine that has not been exploited since the early E.D. diesel of some 16 years ago. This is the capacity of the "Jena 2D," actually 1.97 c.c., distributed by **Skoi-Kits Ltd.** at £5 2s. 6d. in two versions, either reed valve or rear rotary valve induction. Bright blue anodized head and long ball race supported shaft in neatly die cast crankcase are prominent external features. A compression screw locking bar and spare reed valve come with the engine, now being run-in prior to obtaining test r.p.m. figures. The manufacturers' claim .26 B.H.P. and a rev range of 12 to 17,000 r.p.m.

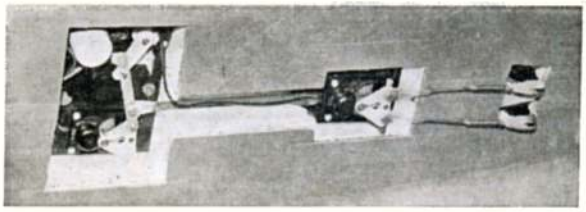
Above: Jena 2D reed valve 2 c.c. with twin ball bearing supported crankshaft.



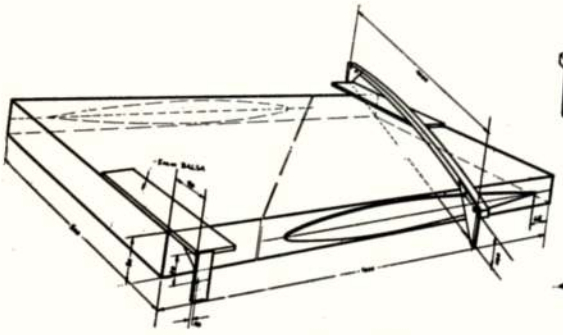
Over the Waves

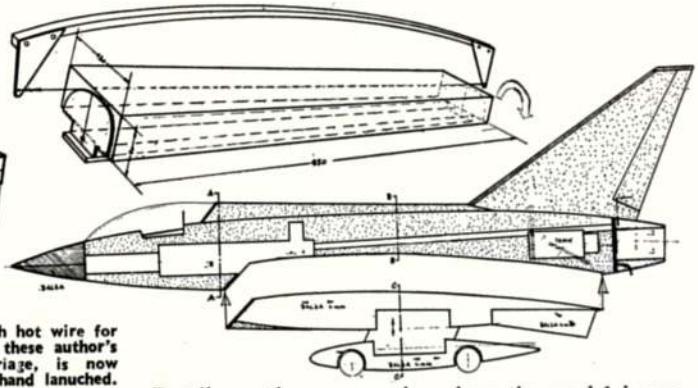
WAY BACK in February 1957, we introduced to AERO-MODELLER Plans Service, a remarkable radio controlled Delta design from Germany known as the *Delta* 707 by F. W. Biesterfeld. As is the case with many advanced designs, Delta 707 took some time to become "accepted" by the modelling fraternity, but gradually it became more and more popular and a considerable number of plans have been sold throughout the world.

At left, charm of Delta 707-E is doubly emphasised in this view, which displays its earlier form, using rudder control. Above, is the Johnson 29 powered, 31 in. semi-scale "Mirage" and below, a schematic showing how six channels operate the control system using two Graupner Bellamatic Mark II servos for primary elevator and aileron action and a Graupner Servo-automatic for trim with Graupner control linkages, as indicated in the photo.



6 Channel Elevon control system for Delta models by F.W. Biesterfeld





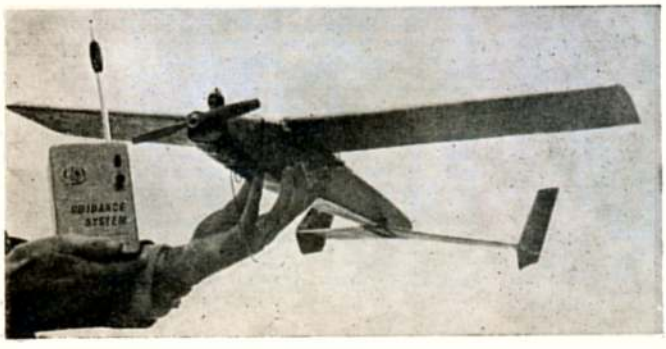
Method of cutting block expanded polystyrene with hot wire for wing panels and fuselage sections can be seen in these author's sketches. Belly tank tandem wheel undercarriage, is now replaced by a single landing wheel, model being hand lanuched.

One might have expected that this 36 in. Delta would have inspired others to produce their own designs. A few have appeared in the U.S.A. but it was not until the recent World Championships in Belgium that we were able to see a really advanced development of the basic model and this as flown and built by Ing. F. W. Biesterfeld himself.

For a start the construction of the model was remarkable, being entirely from expanded polystyrene cut by hot wire from the solid and sheathed with balsa. The parts can, in fact, be cut out within an hour and the weight is certainly no more than a conventional model though strength is much improved and the solidity of the structure matches the high speed of flight. The model demonstrated at Genk was a 41 in. variation of the Delta 707 with a weight of 55 ozs. Initially it was powered by an OS.19 but in Belgium it had an OS.35 pusher with 8 channel Grundig radio control, 6 on the elevons and 2 on engine throttle. Rudder is not necessary and the entire system is modified to proportional control by superimposing a Graupner Bellaphon transmitter pulsing unit on the Grundig. A companion model has also been made for the 707E, being a 31 in. semi scale Mirage Delta fighter with a Johnson 29. This has the same radio control equipment—but we were more than satisfied by the performance of 707E, which was quite fast enough!

From reports in foreign magazines, it would appear that we were not alone in our impression that this was the most spectacular model at the World Championships meeting. The high speed and so beautifully smooth loops, slow rolls and flick rolls, dead straight inverted flight and fearful vertical dives were enough to impress the most hardened observer.

Below, FREE FULL-SIZE plan in December Radio Control Models & Electronics includes "Twophin," a novel, quick to build single channel 30 in. all-sheet balsa design tested with pulse rudder and R.C.S. Guidance System. A ideal rough field flyer/radio combination. Right, is Ing. F. W. Biesterfeld showing simple assembly of his remarkable Delta after demonstration in Belgium.



Details on these pages show how the model is constructed and the servo mechanisms arranged for 6 channels to operate the elevons. Root chord of the Delta 707E is 25½ in. and the airfoil section symmetrical.

Full size plans

Flight tests with Peter Holland's all-sheet "Twophin", which is one of two free full-size plans given with December *Radio Control Models & Electronics*, enabled us to make further assessment of the R.C.S. "Guidance System". The 30 in. model, which can be made from four sheets $\frac{1}{32}$ in. x 4 in. and half a sheet of $\frac{1}{16}$ in. x 3 in. balsa was powered in prototype form by a D-C Dart and used a manual pulse, control on one of the twin rudders. The lightweight, handy size Guidance System transmitter proved to be an ideal control box, well tried by a series of "Guinea Pig" testers and the tiny receiver never missed a blip. Range and sensitivity are more than adequate, and the wiring system is simplicity itself. What a blessing these modern radio outfits are! It seems like the days of "fit and forget" are with us at last—provided of course that battery power is adequate. Full supporting gen for manual pulse control is included in December *R.C.M. & E.* and if you want to know more about batteries—we recommend the feature in this year's AEROMODELLER ANNUAL.

Pioneer Plastics

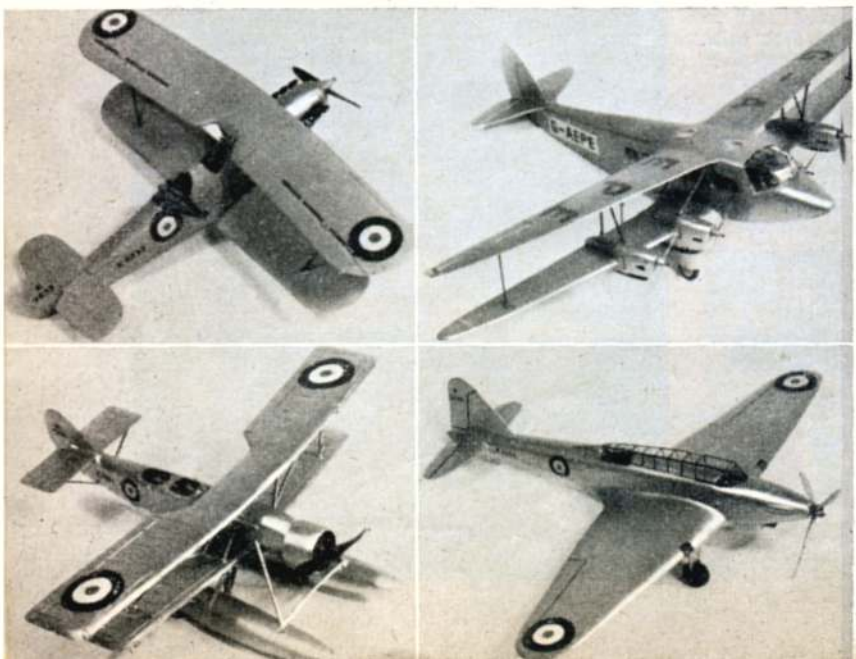
TWENTY-SIX YEARS OF MOULDED MODEL KITS

by W. R. Matthews

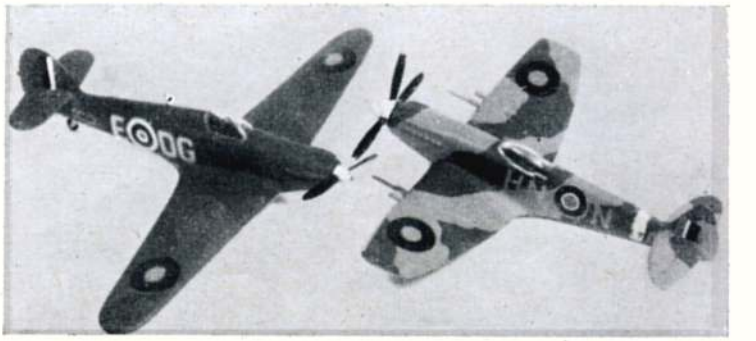
TO MESSRS. *International Model Aircraft* goes the honour of inventing plastic model kits as we know them; their *Frog Penguin* series first appeared at the beginning of 1937 and grew rapidly until by the time the war broke out in 1939 there were over 30 models in the range; as far as the writer knows, no other firm either in this country or overseas made any model kits in plastic at all. This period was the hey-day of *Skybirds*, which were probably the first solid model kits of any kind, and while, with their pre-formed wood parts and cast lead and aluminium details, these represented a notable advance on models hacked out of blocks of wood at home, they could not compare with the beautifully detailed "Penguins."

Styrene plastic was, of course, unknown in pre-war days, and the Frog kits were therefore made from acetate. This has totally different characteristics from the present-day material; it is softer and melts at a much lower temperature, which makes it a good deal easier to produce the moulds than for a modern kit. For acetate these do not need to be cut from solid blocks of tool steel, but can be formed by an electro-plating process; moulds made in this way are not nearly strong enough to stand up to the temperatures and pressures required to shape styrene. The disadvantages of acetate are that it is heavy and expensive, warps with age, and most important, is not strong enough to form parts like wheel axles and hinges for retracting undercarriages — on the "Penguins" these were made of wire, and various blocks of balsa were included to anchor them, which must have made the kits much more difficult to produce.

Acetate will, however, take fine detail, and the detailing on the best of these kits will stand up to anything produced today. The general quality of the models was superb; several bottles of paint and cement were included in each (cellulose, which does not affect this type of plastic) and a transfer sheet of better quality than most that are made now. One curious feature of these transfers was that the serial numbers for pre-war silver-finished types were printed on a silver background, which matched the paint very closely, and only four serials were used in the entire range—K 4727, K 4206, K 5142, K 5789—these being distributed amongst the appropriate types at random; Special, and correct, serial numbers were given for later types, such as Lysander and Magister. (The writer would be very interested to know what aircraft actually carried these serials.) Packing was standard throughout the range, square silver boxes being used, with a small label carrying a photograph and the trade name on a greenish background. All parts were held to an inner floor of the box with elastic—proper covered elastic, not rubber bands!



Heading shows the Frog "Penguin" kit for the Supermarine Spitfire Mark I, as supplied with separated parts, dopes, adhesive and transfers held to a base in the box by shirring elastic. Parts are displayed, at right, note the provision for wheel wells in wings. Acetate mouldings are dark brown in colour, ready for camouflage painting. Left, a neat quartet, upper left the Hawker Hind Trainer with blind flying hood made in fabric all yellow with silver nose. Upper right, D.H. 86A Airliner "Diana" complete with interior seating for passengers and crew, basic moulding in bright blue. Lower left is the Blackburn Shark Seaplane complete with two sizes of bomb and a torpedo, plus seats in the triple cockpits, with instrument panel, a light grey moulding. Last, the Fairey Battle Bomber, all silver and with retractable undercarriage plus neatly detailed Hamilton type propeller.



An early Hawker Hurricane Mark I kit compared with one of the 1950 series Supermarine Spitfire XII. Mouldings were slightly improved but shapes still lacked an absolute adherence to true lines. Retractable undercarriages were always a feature of these pioneer plastic models.

This quality cost money, of course. The cheapest models (small aircraft such as the Fury) cost 2s. 6d., while the most expensive (Singapore and Empire flying boats) were 42s. Multiply these prices by at least three times, and it will be seen that these were really luxury models; as a comparison, the Penguin Wellington cost 12s. 6d. in 1939, say 40s. now, while current models to the same scale are 6s.!

They went together very much as modern plastics do, except that there were few, if any, locating pins, and care to be taken to fit the parts accurately. If one was not too clever, it was a good deal more difficult to clean up poor joints, as owing to the softness of the plastic too much could be removed very quickly with a file or sandpaper, and the model ruined. However, provided normal care was taken, particularly with delicate parts (aircraft such as Spitfire, Hurricane and Me 109 were given retracting undercarriages, and this on 1/72 scale; no modern manufacturer goes to such lengths) the results were accurate and attractive.

As stated above, the range was wide, and all models were made to a common 1/72 scale. The following are known to have been issued before the war:

Airspeed Envoy (civil)
Airspeed Envoy (military)
A-W Scimitar
Avro Rota Autogyro
Avro 504K
B'ackburn Shark (Landplane)
B'ackburn Shark (Seaplane)
Blackburn Skua
Bristol Blenheim I
D.H. 86A
Dornier Do 215
Fairey Batt'e
Gloster Gladiator
Handley-Page Hampden
Hawker Fury
Hawker Hart
Hawker Hind Trainer
Hawker Demon
Hawker Osprey
Hawker Hurricane x
Messerschmitt Bf 109B x
Miles Magister x
Monospar Ambulance
Percival Gull
Short Singapore
Short Empire (Sectioned)
Short Empire (Complete)
Supermarine Spitfire x
Vickers Wellington
Vickers Welles'ey
Westland Lysander

Heinkel He 111 and Messerschmitt Me 110 were announced in 1939, but probably never went on sale.

Camouflaged aircraft were moulded in the correct shade of brown, others in the correct base colour where possible; Scimitar was cream, as was 504K, D.H. 86 blue, Hind Trainer and Magister yellow, Monospar Ambulance white. Silver aircraft were pressed in a neutral grey, and painted, there being no silver plastic. Where applicable, all models had retracting undercarriages, except Envoy and Skua, the latter having folding wings (incidentally, both this and Battle were silver; the Battle was also issued in camouflage). Markings on camouflaged types were revised periodically, red-and-blue roundels replacing yellow-red-white-blue, and code letters being included.

In general, the quality and detail of the earlier models was better than the later, except for the Wellington, which was exceptionally good.

By the end of 1940, these kits had disappeared from the market, all except those marked with an x in the list above, never to return. In 1945, a new series began to appear, starting with re-issues of the four marked in the list above, and adding new models at intervals, some of which are detailed below. These post-war kits do not compare in quality with the pre-war range; though they still had retracting undercarriages, they were in most cases inaccurate and poorly detailed—indeed one model, the Spitfire XII, is so bad as to be not worth making. At first, a bright orange plastic was used for all kits, but as things became rather easier, a quite good camouflage grey was introduced. Paint was still included, but not cement; transfers and boxes did not compare with pre-war, while prices had approximately doubled.

Post-war Series (1950)
De Havi'land Mosquito
Fairey Barracuda
Focke-Wu'f Fw 190D
Hawker Tempest II
North American Mustang P-51D
Messerschmitt Me 110
Hawker Typhoon IB
Hawker Hurricane
Miles Magister I
Republic Thunderbolt P47D
Supermarine Spitfire XII
Supermarine Spitfire I
Gloster Meteor
De Havilland Vampire
Bristol Beaufighter x
Lockheed Lightning P-38J
Grumman Hellcat F6F-3

And probably others, of which there is no record. At this late date the plastic kits were known as Penguin series I. There was also a balsa range, called Penguin series 9—of hardwood and plastic parts.

Should any reader come across one of these models, however battered, it should be restored, as they are now valuable collectors' pieces. Restoration is not as difficult as it sounds; first break the model into its component parts, and remove all old cellulose by soaking in dope thinners (this will not harm acetate plastic, unlike styrene). Warped parts may be straightened by hoding them under a stream of water from a tap at about 160 deg. F., and straightened with the fingers. Re-assemble the model, using balsa cement; missing parts may be replaced with parts from modern kits which in some cases duplicate the pre-war models; otherwise new parts may be made from scrap plastic. Styrene will stick perfectly well to acetate if the acetate parts are coated with balsa cement, the styrene parts with plastic cement, and the two pressed together while both lots of cement are wet. The model can then be painted as required (cellulose dopes can be used) and new transfers applied. The result in many cases will be a most attractive model of a rare type.

Production of Frog Penguins ceased in 1950, at just about the same time as Lindberg were bringing out the first styrene kits in America, but the glory had departed many years before, at the outbreak of war. Frog themselves introduced styrene kits in 1955, but it is not being unfair to say that these never achieved the reputation of the "Penguins" though the present day series are fast regaining the fame of their forebears.

World News

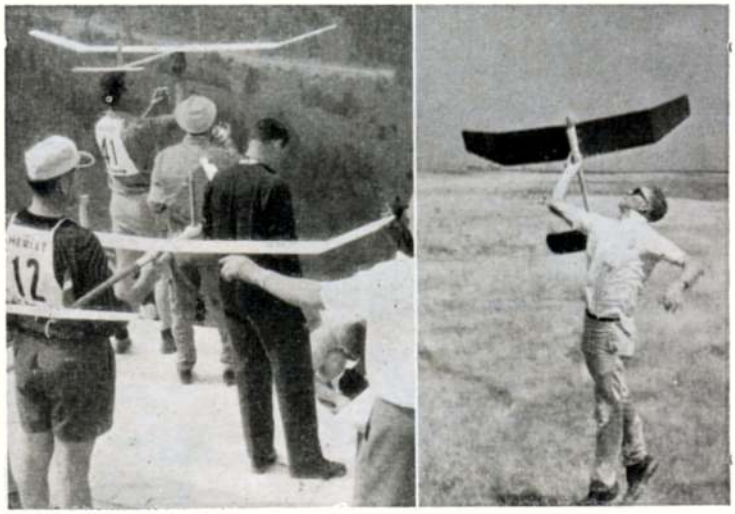
Competitors from five nations **(Austria, Germany, Liechtenstein, Switzerland** and **Yugoslavia)** went to Leinz, Austria for the fourth *International Dolomite Cup* for radio control. Situated in the Tyrol, surrounded by mountains, this was a fine venue for a well supported meeting. 54 entered mono-control gliders, 73 mono-control power and 30 in multi channel. Though fewer than these figures actually made flights, performances were good. Lenzhofer from Klagenfurt (Austria) won glider with a semi-scale 10 ft. *Olympia* using "Metz" 3 channel with flaps. Another semi-scale won mono-control power, based on the *Job* 15 for Ing. Dettelbacher, also from Klagenfurt. Among the interesting entries was one from Yugoslavia with built up ribs, full-size style and a number of Deltas. Bauerheim from Herrenburg near Stuttgart (Germany) was the winner of multi channel using a Super Tigre 56 powered *Taurus* with Bellaphon gear. Freddy Bickel of Switzerland won the combination prize for best overall performance in all classes.

Four nations **(Austria, France, Germany** and **Switzerland)** entered the 11th *Walldorf F.A.I. Free Flight International* in ideal weather. F/F events include A/1 glider, 1 c.c. power, tailless and a novel event—A/2's with 1 c.c. supplementary power. There was also a *sunrise* contest (5 a.m.) won by Weyrauther in still air with an average of 199 secs. using a 16½:1 aspect ratio design. A/2 standard was very high, no less than eight making perfect scores, Windmuller of Germany winning the fly-off. Many models had all balsa surfaces. Wakefield was the only other event to be won with perfect scores, Hofsass of Germany winning the fly-off with a wind tunnel design propeller/airfoil combination — he works at an aerodynamic institute. As a matter of interest the 1 c.c. A/2 event (20 secs. engine run) went to Salzer of Offenbach (Germany) with a total time of 776 secs.

The **Czechoslovakian** Championships for radio control was also an international with teams from **East Germany, Hungary, Poland** and **Yugoslavia** taking part. Single and multi channel categories were flown over the three day event and Merrory of Yugoslavia took first place in both power events. Lichtblau and Michalovic both of Czechoslovakia were single and multi channel glider winners. Interesting point is that Polish and Yugoslav teams used Graupner gear.

"Europa Cup 1963" for slope soaring was the new title for the previous "Coppa Stella d'Italia." Thus the event became truly international with 43 "foreign" visitors and 32 Italians taking part. The

TOP ; left at the "Europa Cup", Rovereto, Ita'y, Mario Feruglio from Vicenza launches his vane steered model off the platform on the mountain-side. RIGHT, leading lady in the event, Marcella Ferluga from Trieste demonstrates her method of launch. LEFT ; Warren Williams of Upland, California, produced this opposed-prop twin motor indoor model at the U.S. Nats with asymmetrical layout to allow props to overlap. Extreme LEFT, Gerry Thomas at the Jim Wa'ker Memorial contest, Tacoma, Washington, U.S.A. converted an A.M.A. specification model to F.A.I. overnight by increasing the wing area on one side with a removable tyne cuff, which contained his line connections within the wing. Looks a little off centre—but it works!



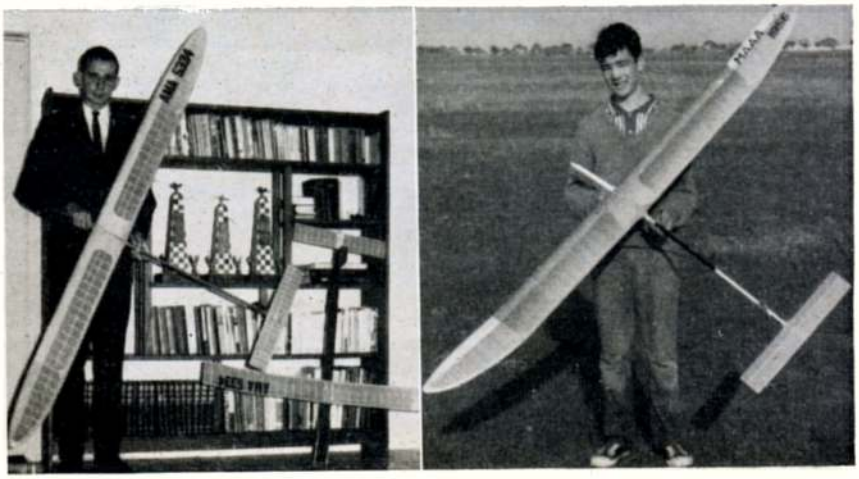
LEFT ; Winner of the "Europa Cup" for slope soaring models was Ferdinand Kaczor of Landshut, Germany, seen about to make a launch into the void of the valley from the mountain-side platform.

RIGHT ; Bob Cherny, U.S. Nationals F.A.I. power winner and winner of the postal international reported in text, demonstrates his javelin type launch he has used with much success.

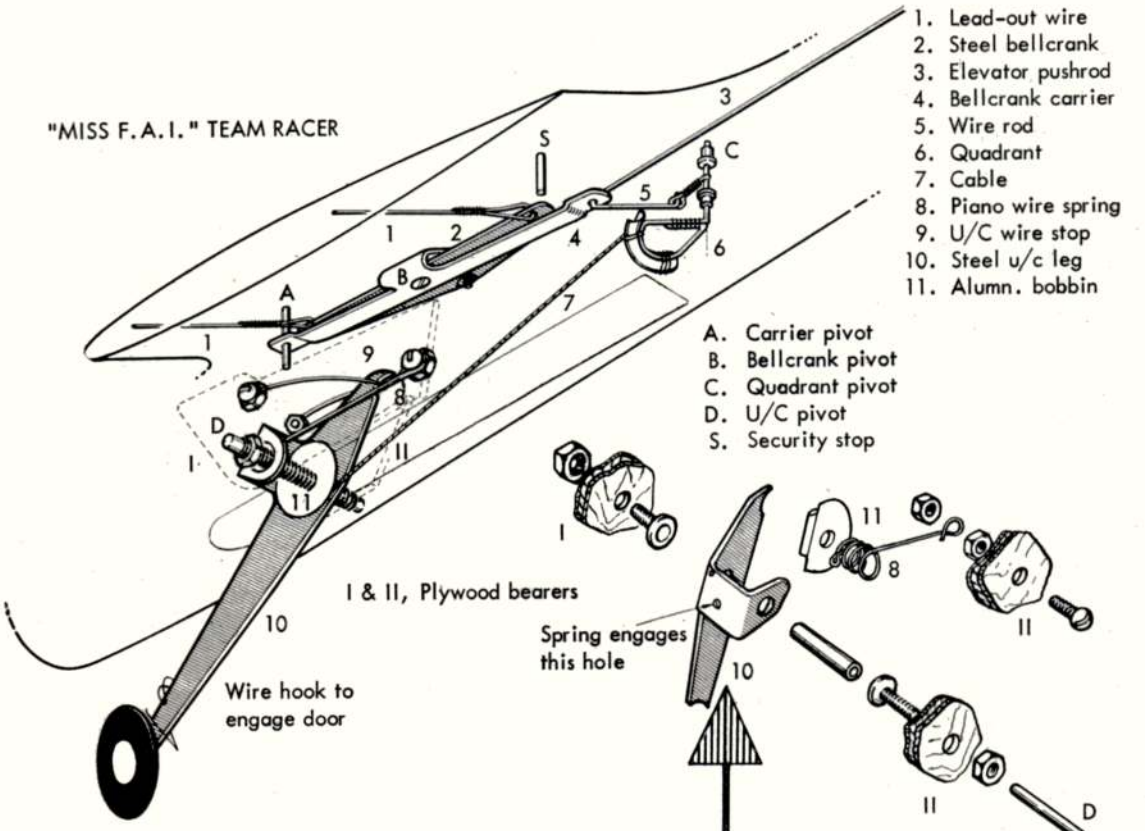
contestants from **Austria, Germany, Italy** and **Switzerland** were lodged in the colourful town at the bottom of the valley and the contest held on the slopes of Sommo Alto, about 4,000 ft. a.s.l. Chair lifts were used to transport people aloft and fine hospitality offered by the Italian hosts under the guidance of the indefatigible Prof. Vettorazzo. Three flights of five minutes were permitted but wind direction proved invaluable. Using walky-talky gear, the Germans showed team superiority and individual winner, Ferdinand Kaczor of the victorious Landshut club, Germany, scored 784 secs. Landshut proved the winning team and deservedly so since this is the original source of magnet steered models and the home of the inventor, Hans Gremmer. Kaczor has been five times a 2nd place man so his victory on 4th August was well received. Next "Europa Cup" takes place in 1964 at Spitzerberg near Vienna.

Included in the **U.S.A.** Nationals was the final F.A.I. Indoor Team selection trials out of which has come a very powerful group of three top class flyers, all of whom are capable of making flights of more than 40 minutes. Using the system of regarding two best out of six flights, Bill Atwood, the famed model engine designer and father of all front rotary valve engines from the original Cyclone to the present day Cox and Wen-Mac, made 43:17 and 42:36. Second to him in total was Ed. Stoll with 41:11 and 41:21 and third, Frank Cummings, another veteran flyer with 37:56 and 43:28. During the trials Ernie Kopecky established a new U.S. National record of 43:42 but his next best flight was 34:08. Held in the hangar at Santa Ana, the meeting was marred in a way by the large number of hung-up flights which eliminated several other very capable flyers. When we spoke with Bill Atwood during his visit to England earlier this year, he stated that his remaining ambition was to get on the indoor team and it looks as though he went all out to make sure with his unusual geared model.

A postal even arising out of requests made through AERO-MODELLER, matched the keen group from Concepcion, **Chile** with the Northern California F/F Council and also Wip-Mac in Cape Town, **South Africa.** These were two quite independent events, in the first matching (for the three F.A.I. classes) gave victory to the Californians by virtue of their success in power and Wakefield. The South Africans also beat Chile on their flight total but only won the Wakefield class as a team. Significant fact was the prominent part played by Luis Vasquez of Chile, top scorer in *all three* Chilian teams against the U.S. and in glider and power against Wip-Mac. His main skills are apparently in A/2 glider. For power he chooses to fly Ed Miller's *Texan Fai-Ton*. We should be only too happy to arrange further international postal events of this nature.



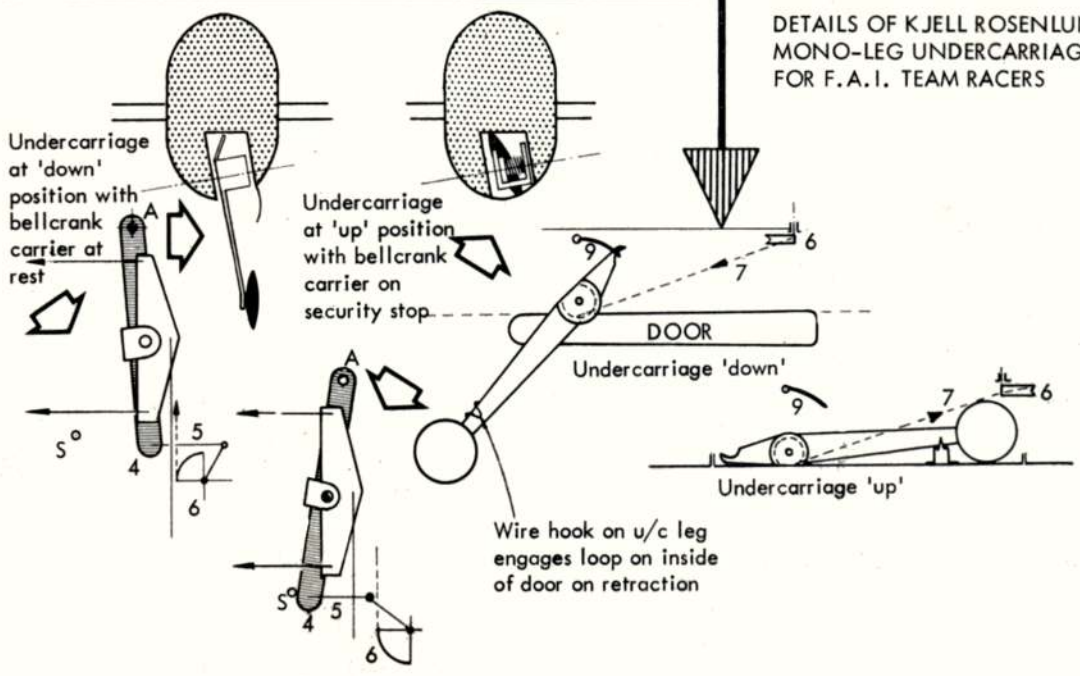
LEFT ; Gytis Tamulaitis of Los Angeles, California, won junior Wakefield (12:34) and 2nd in junior open rubber (13:45) with the A.P.S. "Pandora" Wakefield. With the "Sans Egal" glider he took 1st in junior A/2 glider (13:05), all these events at the U.S. National Championships. To confirm the fine success of A.P.S. design "Sans Egal", Bob Wilkins, in next photo, though still a junior, beat all seniors in the Victoria State Championships, Austra'ia with a total of 808 secs. He also won Wakefield (with 899.5 secs!), A/1 glider and was 2nd in open rubber, junior glider and junior rubber!

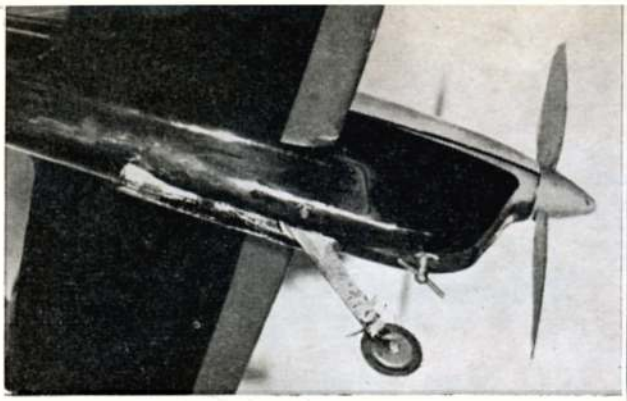


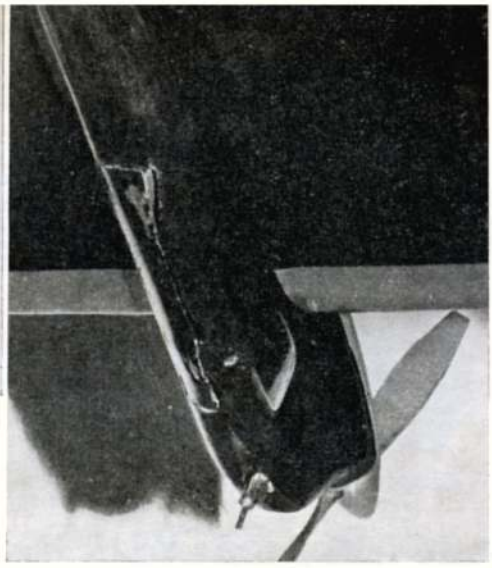
Retractable Undercarriages

PART 4

DETAILS OF KJELL ROSENLUND'S MONO-LEG UNDERCARRIAGE FOR F.A.I. TEAM RACERS







"Down" and "Up" views of Kjell Rosenlunds racer.

WHILST IT IS more usual to employ a retractable undercarriage for aesthetic purposes on a scale or semi scale model, there are enormous drag reduction advantages to be obtained and these can be turned to very good use in competition model classes.

Team racing is the obvious thought. Kjell Rosenlund has an enviable reputation for his international championship successes with conventional two leg and single leg "Miss F.A.I." racers (available as A.P.S. drawing CL.776 price 5s. 6d.). At the 1963 Criterium of Aces held at Genk, Belgium, during August, he produced his Super Tigre G.20 D powered version of "Miss F.A.I." with a retractable single leg.

Inspiration for the idea came from a suggestion by his friend Mario Pontti. Mario had tried to make a retractable undercarriage but did not succeed and Kjell took the idea further with his own ideas. The basic thought was to combine those very difficult to obtain values of *simplicity* and *reliability*. Rules are such that *if* a retractable undercarriage is employed, it *must* return to the landing position or the flight is disqualified.

An obvious primary desire would be to let the centrifugal force effect on the model supply the energy for undercarriage gear movement.

A third line would be intolerable, otherwise the "Roberts System" would be a natural choice for undercarriage operation. Calculations have proved that line drag absorbs a high proportion of the engine horse power and even the difference in the drag between two single strand wires and two multi strand wires is sufficient to have an effect on the flying speed.

One is left, therefore, to devise a method which allows the model to swing laterally on the line and in so doing, move the undercarriage. A balance must be struck between the method of restricting the upward movement and the the centrifugal effect so that the undercarriage will only retract when high airspeed has been obtained and will, therefore, come down quickly as soon as airspeed falls off. This in turn introduces the major problem of friction in the works, which must be overcome in order to achieve reliability. Repeated ground tests are essential and it is no earthly use building a copy of this Rosenlund system with the vain hope that it will "probably work in flight" if the static tests are not as they should be.

Operation starts with the pull on the lines **(1)** moving the bellcrank **(2)** sideways relative to the model centre line. The bellcrank is mounted in a steel carrier **(4)** which pivots on a wire peg **(A)** and swings through a motion of about $\frac{9}{16}$ in. at its opposite end where it pulls upon the rod **(5).**

Now this is connected to a quadrant **(6)** made up of wire and with an open sided channel, fabricated from brass tubing, around its curved edge. To this is attached a length of multi strand wire **(7)** which transmits the actual retracting force to the leg.

It will be seen that as the bellcrank carrier swings to its extreme position during high speed flight, so the quadrant is pulled through 90 deg. about its pivot **(C)** and the undercarriage leg **(10)** is retracted. The restraining force which determines exactly when the retraction takes place and at the same time effectively holds the undercarriage in the down position for take-off and landing, is the piano wire spring **(8).** This is strong enough to force the leg forward which pivots about the rod **(D)** supported in plywood plates **I** and **II** against the stop **(9),** where a hook formed in the end of the leg engages in the extremity of a vee shaped wire restrainer. To restrict the bellcrank carrier movement there is a security stop **(S)** and on the undercarriage leg itself there is a thin piano wire engaging catch which retracts the covering door. The door is hinged with a restrainer so that it will not open more than necessary and then as the leg retracts, the wire hook just above the wheel engages a loop on the inside of the door, pulling it closed. The fender above the wheel is also shaped so that it will force the door open as the leg retracts, prior to engaging the loop on the inside, thus eliminating a possible snag of the leg remaining half in, half out, jammed on the door.

Sketches and the exploded view of the assembly explain the details and the only part we have not mentioned thus far is the aluminium bobbin **(11),** which holds the leg end of the retracting wire **(7).** It is important that the channel on this bobbin and the quadrant **(6)** are made so that the wire cannot be displaced.

In order to achieve a complete retraction the whole unit is angled in front elevation as can be seen in the sketches. The unit is compact and simple but the success of operation depends entirely upon the balance of the spring force which retracts the upward movement and the centrifugal force.

In other words, this means making a variety of springs **(8)** and testing these before the first flight is made. A really heavy pull is needed on the lead-out wires **(1)** in order to pull the leg up on Rosenlund's model—equivalent to the full centrifugal effect of, we should guess, at least six times the weight of the model. We repeat, many ground tests are essential and it is advisable to make sure that the mechanism operates at a fairly high speed in the region of 80 to 90 m.p.h. Action is then very quick both in upward and downward movement. One more thought —ensure that the bearing plates **I** and **II** are securely installed to withstand heavy landings.

AERO 35

ENGINE ANALYSIS No 117

by R. H. Warring

THIRTY YEARS of development around a basic single cylinder layout have resulted in an overall 'sameness' of design falling into standard patterns for glow or diesel in various categories, irrespective of the source of origin. The possible alternatives, largely limited to detail design, have been more or less fully investigated and sorted out on merit.

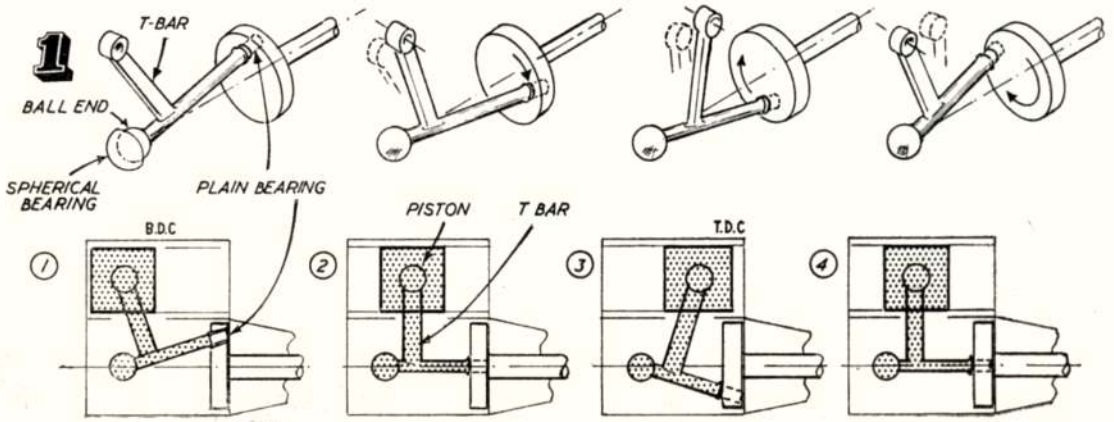
It is relatively easy to produce something different just for the *sake* of being different, but it is the results achieved which count in the long run—both to assess the technical merit of the originality involved and to exploit its commercial possibilities. The Aero 35 is one of the very few ideas which have appeared in the past 30 years which has a fair chance of achieving success in all categories.

Certainly it must be the most original *production* motor to appear in model engine history since the first diesels (and they were still conventional in layout) and the most cursory examination shows that it is far more than a 'gimmick' for commercial exploitation. The whole design and production has obviously been handled by extremely competent and skilled practical engineers and the presentation is not just another 'drawing board marvel'. To get an engine to work at all with the cylinder parallel to the crankshaft is something of an achievement, but the Aero 35 not only works but runs extremely well and is certainly as easy to start and handle as any conventional glow motor, with performance well up to sports engine standards. The advantages it offers, apart from sheer technical novelty, are perhaps debatable, but at least one feels after handling it that it is a *worthwhile* engine to use and not one to relegate to the shelf after the initial novelty has worn off—and as has so often happened in the past with 'different' engines, the frustrating features having become all too apparent. The Aero 35 has no such limitations that we can find.

The geometric problem of providing connection between the piston shuttling backwards and forwards parallel to the crankshaft in the form of a driver to rotate the crankshaft has been solved in an extremely ingenious and essentially straightforward manner —the latter being the hallmark of good engineering design. The basic motions involved are shown in diagrammatic form in *Fig.* 1. The crank web carries a bearing lined up at a cone angle with a central rear bearing (on the crankcase backplate). Into this sits a rigid inverted 'T' shaped member (the vertical arm of the 'T' being 'wiggled' rather than straight, but this merely to match the internal geometry). The 'bar' of the 'T' carries two bearing points, one at each end. The front end is plain, fitting into the bearing hole in the crank web. The other hand is a speherical ball surface locating in the rear central bearing, which is an open cup.

From the diagram it will now be apparent that if the crankshaft is rotated, the front end of the 'bar' of the 'T' will describe a circular path (following the path of the hole in the crank web), whilst the rear (ball) end pivots in and is retained within the central cup bearing. Provided the 'T' member is constrained in one plane (as it would be when connected to the piston, the top of the vertical arm of the 'T' thus describes a reciprocating or rocking motion, the actual geometry involved being so calculated that this motion is *substantially* parallel to the crankshaft.

It remains only to pivot the piston to the upper end of this vertical arm, and again the solution employed is ingenious. Since it would be impossible to ensure *exactly* parallel motion of the 'T' end to the crankshaft and the little end must also rock from side to side the bearing end terminates in a pivoted plunger which locates in a bearing hole in a substantial vertical central web in the piston. Thus, whilst *shuttle* movement is exact due to the close



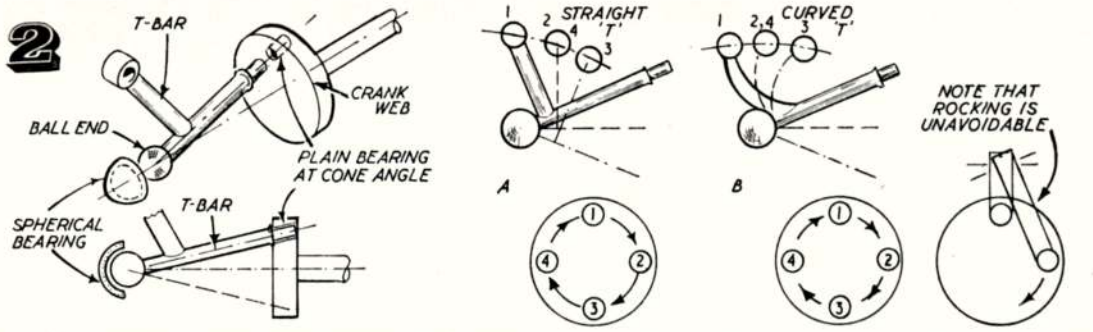


FIG. 2. T-bar alignment is shown diagrammatically on left. Note that with a straight vertical leg to the 'T' (A) the rocking motion 1, 2, 3, 4 is distinctly non-parallel to the crankshaft. With a curved arm (B) near parallel rocking motion can be obtained.

bearing fit, the bearing plunger is free to slide up and down inside its bearing surface to accommodate out-of-parallel movement.

In a working cycle, of course, the drive is transmitted the other way round, but the motion is easiest to understand described as above with the piston movement being initiated by turning the crankshaft. Firing of the charge merely forces the piston down the cylinder in the conventional manner, rocking the vertical arm of the 'T' rod backwards and giving a direct rotary pull on the crank web through the front bearing of the bar of the 'T'. Balance of the complete revolution is completed by the inertia of the crankshaft carrying the front end of the 'T' bar round to complete the circle of revolution and 'rocking' the piston back to top dead centre.

Apart from that, the balance of the functional design as governing the gas flow is more or less conventional! Mixture is inducted directly into the crankcase via a rotary valve, compressed in the crankcase chamber and transferred to the cylinder head via a shallow transfer in the backplate connecting with a transfer passage up one side of the cylinder, transfer flow being initiated by the descending piston opening the cylinder wall port. Exhaust ports are cut directly in the cylinder wall at 90 deg. to the transfer in diametrically opposed positions, *i.e.*, one set of exhaust ports on each side of the cylinder. This 'conventional' porting, however, is quite original in detail.

The extremely long crankcase unit carries the crankshaft mounted on two ball races. Inside the crankcase chamber itself the crank web is extremely thick (approximately $\frac{7}{8}$ in. with a concave inner face). This web is stepped at one side to provide timing for a $\frac{3}{8}$ in. x $\frac{1}{4}$ in. port opening in the crankcase wall. This port is open for something like 128 deg. of revolution, inducting mixture directly into the crankcase.

The crankcase unit casting also incorporates the cylinder, which is fitted with a thin walled steel liner. This liner is slotted for just over half its length on the crankshaft side to provide clearance for the 'T' rod or rocking con. rod; and similarly on the diametrically opposed side to open up the transfer passage in the cylinder casting.

The liner is so thin, and of such unbalanced shape, that it would appear susceptible to distortion. However, it is well supported by the cylinder casting and is not rubbed by a close-fitting piston. The piston is of light alloy of plain external shape (apart from the large circular cutouts in the walls to pass the 'T' bar plunger) and fitted with two cast iron piston rings. The piston top is flat with the edges generously chamfered. Bore finish on the liner is of typical American cross-hatched pattern typical of microhoning, but also bearing some evidence of ring scuffing. Nevertheless at no time did the piston feel tight or generate excess heat and quite reasonable compression was held.

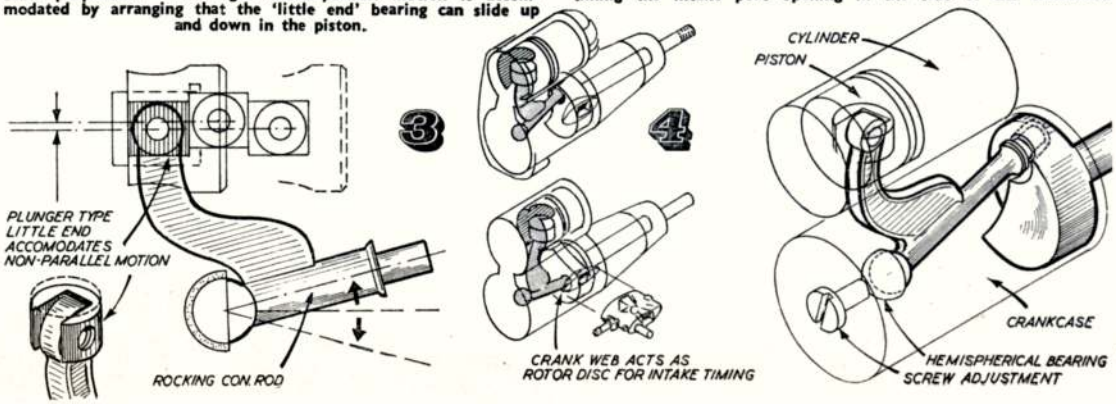
The 'T' bar, or rocking con. rod as it could be termed, appears to be a steel forging with the two horizontal bearings (plain and ball) hardened and ground to finish. The piston plunger at the top of the 'T' vertical arm (corresponding to the little end) is of hardened steel, pivoted on a tubular pin split lengthwise and sprung into position to retain. This plunger is, in fact, rather like a small solid piston with a large slot cut into it from one side, pivotally mounted in conventional piston fashion. External diameter of the plunger is ground to a bearing fit matching the vertical retaining hole in the piston central web.

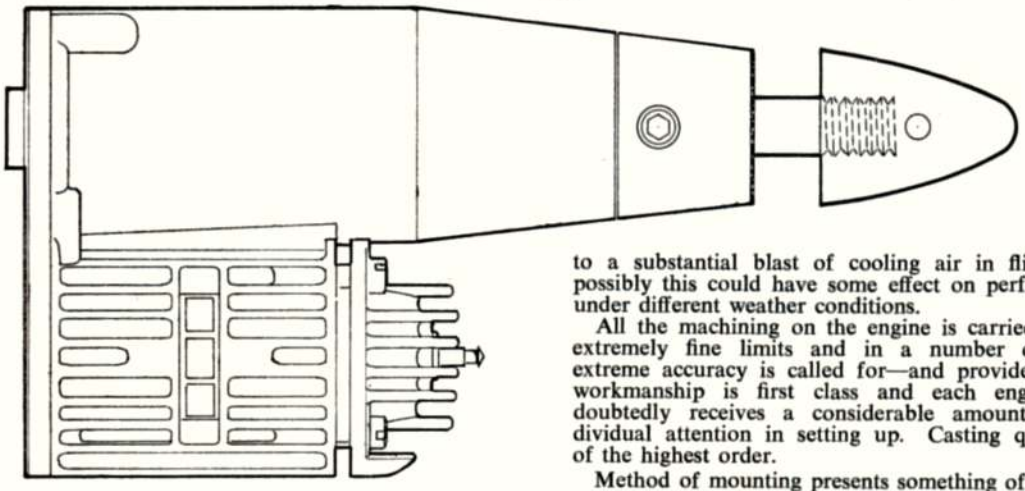
The end cover incorporates a substantial spigot section plugging into the crankcase volume, recessed to carry the rear spherical shell bearing in bronze for the ball end of the rocking con. rod and also relieved for motion clearance. This cover extends upwards to blank off the end of the cylinder, but has a shallow grooved passage cast in to promote gas flow from the crankcase volume to the cylinder transfer passage. The actual transfer passage—from the crankcase volume, across the bottom of the cylinder and then up the side transfer passage—is thus considerably longer than in a conventional layout.

Virtually all the other detail design features are original, as well. The crankshaft is of composite

FIG. 3. Shows the actual geometry of the rocking con. rod in scale proportion. The slight out-of-parallel motion is accommodated by arranging that the 'little end' bearing can slide up and down in the piston.

FIG. 4. Complete linkage is shown in diagrammatic form. The cut-away shape of the crank web is used to act as a rotor disc, timing the intake port opening in the side of the crankcase.





construction, with the extended web in light alloy. The ⅜ in. diameter shaft carried on two ball races housed in the crankcase unit protrudes a matter of ⅜ in. beyound the front housing and over this is fitted a solid dural turning comprising a ¾ in. thick taper section with knurled face stepping down into a ⅝ in. diameter threaded length. This driver unit is secured to and located on the crankshaft with a hardened socket head grub screw. The system looks extremely neat and practical, but we would suspect that the threaded length could be extremely vulnerable in a crash—plus the possibility of stripping the light alloy threads through enthusiastic over-tightening of the spinner nut.

The intake unit is again unusual, comprising a streamlined section casting with flat taper faces following roughly the contraction and expansion sections of the actual venturi. These convergent and divergent sections of the venturi are basically square in section, feeding a ⅛ in. diameter throat. A small spray hole opens into the throat, the fuel flow being controlled by a $\frac{3}{16}$ in. diameter needle valve with a shallow taper on the bottom end. It appears a most unusual and oversize 'needle' for a model engine, but is surprisingly effective in preciseness of setting. Locking action is provided by a tiny nylon screw in the side of the casting. The whole unit has obviously been 'stylised' rather than added merely as a functional item and the result is quite pleasing—both in appearance and use.

The remaining component, the cylinder head, is another pressure die casting, and rather unusual in the form of 'dome' section carrying the glow plug. Deep fins are incorporated in the casting, mainly in the interest of styling again and to 'streamline' the cylinder entry (the head facing forward). Certainly the glow plug itself is in a position to be subjected to a substantial blast of cooling air in flight and possibly this could have some effect on performance under different weather conditions.

All the machining on the engine is carried out to extremely fine limits and in a number of cases extreme accuracy is called for—and provided. The workmanship is first class and each engine undoubtedly receives a considerable amount of individual attention in setting up. Casting quality is of the highest order.

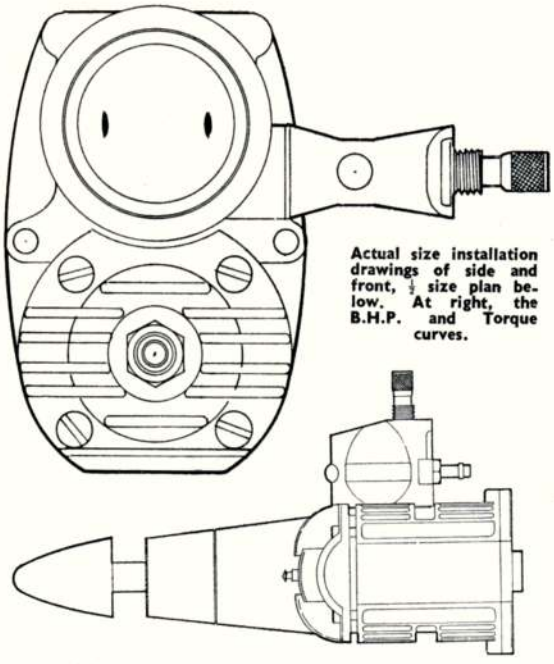
Method of mounting presents something of a problem since this must be radial and only two screw holes are provided. Rather than rely on single bolts through a ply firewall it is virtually necessary to back up the inside of the ply with a steel plate. Apart from the fact that the engine has a substantial overhang when mounted anyway, predominant vibration is in a fore-and-aft plane which is not helping relieve bolt stresses.

Starting and handling present virtually no troubles, provided the engine is finger choked and then generously primed through the exhaust port. It is extremely reluctant to start on choking alone—and virtually impossible to start this way without flooding in many instances, particularly if mounted the 'design' way (cylinder underneath crankcase). We found it easiest to manage mounted sideways!

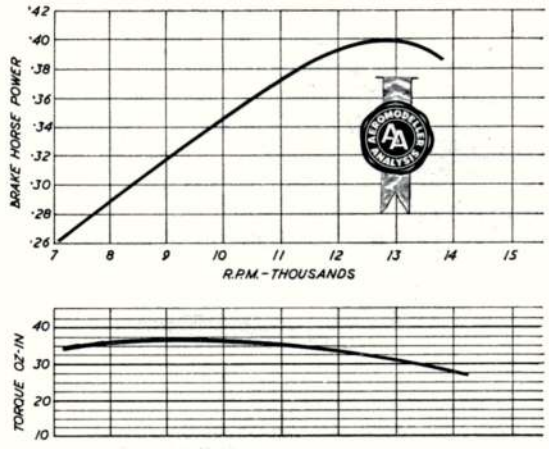
What specific advantages are claimed for the Aero 35 we do not know. Obviously it has distinct attractions for scale installations where it can readily be completely cowled, which would seem the only realistic advantage of the layout. Its specific power output is lower than a conventional engine of similar size, and weight appreciably higher, virtually delegating it to 'sports' category. It is noticeably vibration free in the expected manner, except that there is noticeable fore-and-aft vibration with a non-rigid mount. On a radio model this could call for mounting reed receivers 90 deg. to normally recommended positioning.

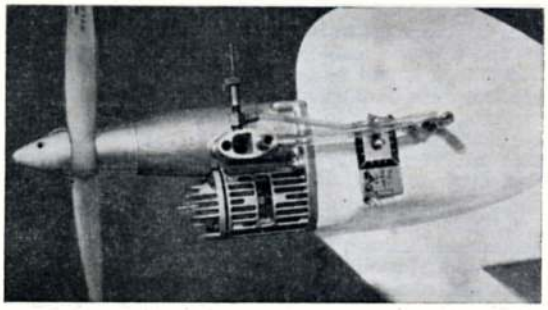
The Aero 35 is an extremely well made engine and a thorough engineering job. Just how well the rocking con. rod system will stand up to prolonged operation remains to be seen. After some hour or so's bench running the *equivalent* little end "piston" and its piston bearing showed signs of rubbing wear and a little scuffing, but nothing too drastic. The open shell rear cover end bearing for the T-rod also showed slight signs of fretting, but this bearing acts more

VITAL PARTS. At left, Rocking Con-rod, attached to piston via small piston plunger. Centre, the unusual carb : with blunt needle valve, right is the "back-end" showing piston dismantled and spherical shell bearing in rear cover.



Actual size installation drawings of side and front, ½ size plan below. At right, the B.H.P. and Torque curves.





Practical fitting on high thrustline design by Dr. Stanley Hill, as flown in the U.S. Nats. Has an additional needle valve added, presumably for control of a "flood-off" timing system.

as a guide than anything else and the marking could have been caused by incorrect adjustment. This hemispherical shell bearing can be advanced or retracted by turning a screw in the centre of the backplate (outside). For proper adjustment it needs to be tightened up to a snug fit, as felt by rocking the piston over BDC by turning the crankshaft, and then backing off the screw a matter of about 10 to 15 deg. If left too free it will tend to "hammer." The main crankshaft assembly we were not able to examine in detail since it was impossible to remove the locking grub screw without risk of permanent damage to the driver unit. The hardened socket head merely relieved the edges of the key rather than gripping—and we suggest a suitable key would be a good accessory to supply as standard with the engine.

We cannot see a great number of Aero 35's being sold in this country—the price at £22 10s. 9d. is against it for popular appeal—but we do feel that anyone buying one for sports model use will get value for money and an engine which, in spite of its unusual design, is both tractable and capable of a good performance. Although an engine styled for commercial appeal it also incorporates very sound engineering. The only serious criticism we have of it as a working engine is the use of a dural driver unit with integral propeller shaft, which we feel is a potentially weak point; although also a safeguard against crankcase damage and we are not entirely happy with the thought of radially mounting an engine of these proportions on two bolts. We would have preferred something of the nature of a 'full size' longitudinal mount—or at least the choice of such a method as an alternative. We cannot, however, do anything but admire the mechanical solution arrived at in translating shuttle piston movement into rotary crankshaft motion. It seems very sound engineering, even if it does add one extra bearing surface to the conventional con-rod layout.

As a final thought on the layout, now that the Aero 35 shows that a shuttle piston action with parallel movement to the crankshaft is a practical engineering proposition, how about a similar layout with two 'top ends' to the cylinder? Then we would obtain *two* power strokes per revolution. The mechanical action could be similar—it just remains to sort out the gas flow problem!

Specification

Displacement: 5.82 cc. (.355 cu. in.)
Bore: .815 in.
Stroke: .680 in.
Weight: 9¼ ozs.
Max. power: .40 B.H.P. at 12,800 r.p.m.
Max. torque: 36 ozs.-ins. at 9,000 r.p.m.
Power rating: .069 B.H.P. per cc.
Power/weight ratio: .042 B.H.P. per oz.
Material specification:
Crankcase: light alloy pressure die casting, incorporating cylinder.
Cylinder liner: mild steel.
Piston: light alloy with two cast iron piston rings.
Rocking con. rod: high tensile steel (casting or forging) with hardened and ground plain and ball ends: hardened steel pivoted little end piston bearing.
Main bearings: two ball races.
Crankshaft: composite construction.
Prop driver and prop shaft: dural.
Cylinder head: light alloy pressure die casting.
Rear cover: light alloy pressure die casting; bronze spherical shell bearing with screw adjustment for rocking con. rod ball end.
Intake: light alloy pressure die casting: steel needle valve; dural fuel pipe connector.
Assembly: crankcase and cylinder as integral unit with fitted liner; cylinder head attached by four screws; back cover attached by six screws (sealing on gasket); intake casting attached to crankcase by two screws; prop driver attached to crankshaft by hardened socket screw.

Propeller r.p.m. figures

Topflite	10 x 6	10,000
	12 x 6	8,600
	9 x 6	11,000
	8 x 6	13,300
KK nylon	10 x 6	10,200
	9 x 6	10,800
	8 x 6	13,200
Frog nylon	10 x 6	10,200
	9 x 6	12,300

Fuel: 70:30 methanol/castor oil.
Manufacturers: Acro Research, 51 Gt. Arrow Avenue, Buffalo 16, N.Y., U.S.A.
British Agents: Performance Kits Ltd., Sandy, Beds.

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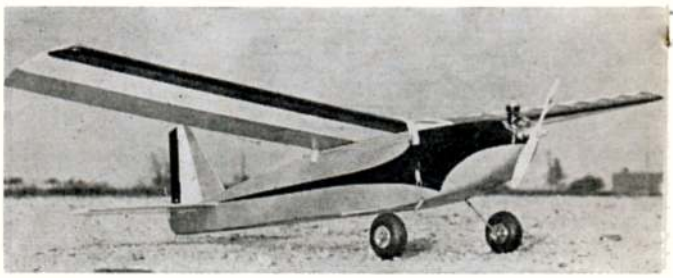
PAL JOEY

42 in. sportster for single-channel radio control with .75 to 1.5 cc.



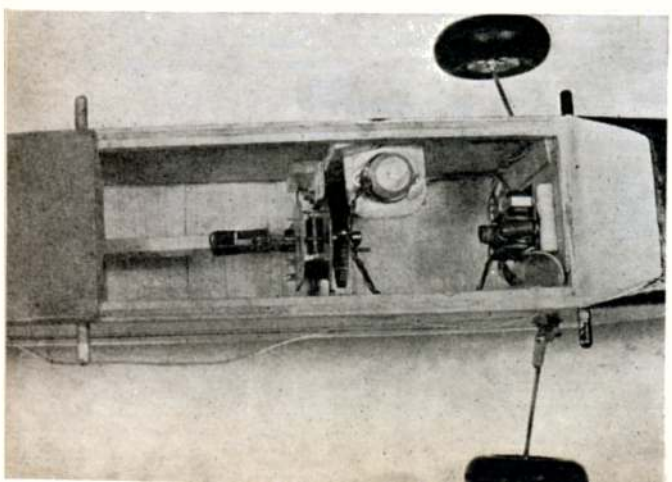
Photographer's daughter Lynn Schneider makes a friendly model even friendlier! This topnotch design by America's most experienced r/c designer was specially commissioned to match "Gemini," "Guidance System," "Minimac," "Kraft" and similar outfits. Installation, with Elmic Commander below the connection plug confirms simplicity.

EXPRESSLY DESIGNED for such engines as the Cox Medallion .049, *Pal Joey* is a rugged, rather docile and easy-to-fly sports model. Weighing 21 ounces with a relayless transistorised receiver (3 volt Kraft in picture), *Pal Joey* has 290 sq. in. of wing area for an approximate wing loading of 10½ oz./sq. ft. and a power loading of about 430 oz. per cu. in.

Pal Joey is not, and is not meant to be, a contest type machine. It does not have the requisite ballooning tendencies for so called stunts—the bane of all beginners and sport fliers in wind. The experienced flier can modify the set-up as he sees fit. Rudder control is enough to ensure turn capability when gliding straight downwind in a 10 m.p.h. breeze.

Considerable down and side thrust is used. With generous lift, downthrust is essential—in this case—to handle trim difference between power off and on airspeeds, and for into wind flight. Side thrust is usually exaggerated with shoulder wings having a high thrust line. There is not much decalage; but anyway, the model is stable. Trimming out a tail heavy condition by shimming the wing (tail being fixed) is *not* recommended in this instance—better to add weight to the nose.

Rudder movement, hence *power,* requires strict adherence to Elmic escapement instructions—and depends on CG position, weight, etc. Supply for the 3 v. receiver—common voltage for radio and actuator—is a DEAC 225-mah 3-cell pack, yielding 3.6 volts—more probably after charging. Some brands of receivers won't oscillate in every instance, or become obstinately erratic, at more than 3-and-a-fraction volts specified, so *follow manufacturers' directions.* A three pencell set-up—two on escapement, one for filament, plus a small B-battery for a relay receiver (if light) should not seriously handicap performance. If pencells are used for a relayless receiver as described above, they should be of the Manganese alkaline type (refer to feature in *Aeromodeller Annual* 1963 for more details). Running a receiver plus actuator on two dry pencells is flying in the face of disaster.



Of some importance, is the fact that long "holds" required on a marginal rudder action will exhaust batteries sooner than expected. The busy type of pilot will run down batteries sooner, too.

It is suggested that the reader experiment with $\frac{3}{16}$ in. and $\frac{1}{4}$ in. rubber for the escapement, noting how the device operates with full turns, and how many turns are left when operation grows sluggish. Leave at least 10 per cent slack. The writer lubricates the rubber and stretch winds $\frac{3}{16}$ in. which does not require really fast pulsing, but, because of the many turns, allows ample signals and consistent timing for the longest flight—even if many turns remain on the rubber (applies to this and similar aeroplanes only.)

A small model like this one definitely should be hand glided until a fast straight glide with a two-point touchdown is achieved. Avoid pretty swooping glide tests which flare out on landing—in the air, there is trouble ahead! We used rather heavy, largish wheels, but other wheels can be substituted according to trim and gross weight. (Retaining rubbers for the knock-off gear, pull the gear to the slant position shown.)

Construction

Anyone who tackles an R/C model certainly does not need to be told how to build a boxy aeroplane. Certain points require clarification. The **wing**, for example, is quite normal with the exception that the spar notches are cut extra deep, so that the spar runs through the ribs and not along the bottom surface of the wing. The notch gaps under the spar are reinforced with $\frac{1}{32}$ sq. pieces cemented to the side of the rib, extending fore and aft of the notch this is simple but strong.

It will be found that the spar can be elevated from the bench on $\frac{1}{32}$ scrap wood, and that the lower centre-section sheeting and wing tips then fit snugly

between spar and bench. The fuselage is normal; but rather than bend sides towards the nose, the accumulated thickness of a $\frac{3}{32}$ in. thick side, a doubler of the same material, and a $\frac{1}{4}$ in. doubler forward of the leading edge (to the firewall), allows rough sanding to contour. Alignment is automatic and strength extreme. The cabin doubler runs back to the trailing edge station but, actually, to mid-cabin would be sufficient.

The top and bottom of the nose is covered with sheet balsa as specified. The nose proper consists of two cheek blocks, plus a bottom block on which the mounts glue. The $\frac{3}{8}$ in. sq. hardwood mounts extended just through F-1 holes on the original, but plan shows mounts narrowed to $\frac{3}{8}$ in. x $\frac{1}{4}$ in. at the rear, engaging bulkhead F-2. They support the batteries in a crash.

Fuselage is made by cutting out sides and doublers, laminating them with contact cement. Uprights are glued on before assembly. Sides then glue to cabin bulkheads, followed by nose bulkheads. It is vital to check top view alignment—bulkheads at exact right angles to sides; lock in place with one piece of bottom sheeting (grain across model.) Install and check escapement operation—with torque rod—before adding bottom cross pieces or closing in fuselage. (Cover escapement thereafter for protection from dust.) Add $\frac{1}{8}$ in. x $\frac{1}{4}$ in. bracing *behind* esc. former.

Two steps require precision. In drawing the sides together at the rear, the stern post position must be *exactly* on the aircraft centre line; check this by placing the fuselage directly over the top view on the plan. Measure carefully the incidence in the **tailplane** before gluing in place. **Fin** and **rudder** are soft balsa. Align tail assembly carefully. You may want to make glide tests with the tailplane spot-glued in place, then cement permanently and add the fillet blocks (soft, hollowed) at tailplane fin junction.

Covering: Use lightweight silk, grain lengthwise on all surfaces, but leave fin and rudder uncovered. These are clear doped several times, sanding between coats with wet-and-dry mix in several drops of castor oil per ounce of dope for this. Original was wet covered, took four (five may be needed) coats of clear and two of coloured. Go easy on aft-end colour doping, ours was orange, black and white.

Flying: Check for warps, balance and alignment. Remove any warps (steaming is easiest method) because any warp may make the plane erratic and accident prone. Be sure there is no twist in the fin. No surface should be cocked, however slightly, when viewed from above, the side, and the front. After establishing an acceptable test glide trim, make first power flight with short engine run and slightly rich setting (do not peak the engine.) Time engine run on ground, then run off all but a minute's fuel before launching. Make the launch smooth, not nose-high and do not heave! After glide trim has been corrected on basis of flight observations, thrust line adjustments take care of stall and/or turn tendencies under power.

Do not be afraid to fly upwind. Most modellers act as if they had 50 ft. range and panic quickly into turns which position the plane downwind—the battle is lost before it begins! Go far enough upwind so that turns leave *Pal Joey* still upwind of the launch point. Well upwind, try gentle turns—don't clamp down the control the first try! Don't panic as long as you are upwind, however high. Frantic controlling leads to disastrous speed build-ups and "hairy" flying. Even a docile model will go like blazes under such circumstances.

Critical point in any rudder-only flight comes when a spiral-down is necessary to kill altitude. Consider that the ground radio range should be at least 1,000 ft. in the air that is very, very high for a small model (a big one vanishes at about 5,000.) If well upwind, the resulting erratic recoveries and zooming about, common to the beginner after a spiral, can be dampened out before drifting back to the launch point. Behind you, the spiral is touchy, often posing an eventual choice between chasing the model, transmitter in hand, or spiralling again into the ground. *Upwind distance is insurance.*

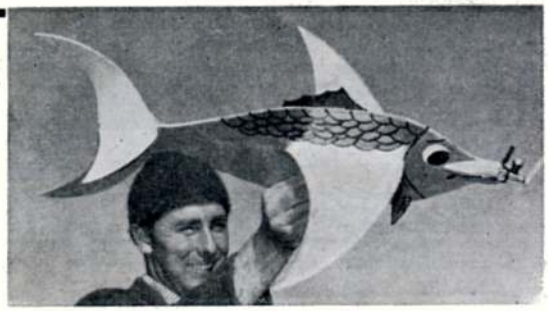
With added confidence, more liberty can be taken. Actually, no one can tell you just how to fly. You may feel like the bird pushed out of the nest, but you do have to do it all yourself. If you have a skilled friend, let him help—even let him make the test flight. First tests should not be made in winds exceeding 5-7 m.p.h. unless you have experience, and once you have that—then *Joey* is your *Pal.*

. . . . . and FISHFACE

By Eric Clutton

Let the Welkin ring!

You'll have to kipper look-out with this—it's liable to bloater pieces. We haddock-ase recently; Sam was fin-ishing the model and Kate, who'd been herring about it, was angling to join us for the first flip. Joe and I had been whiting on the field for hours when Joe said "Look, here comes salmon his pike." "Gurnet skate" said I as she floundered all over the plaice, "That will certainly rock salmon his arrival." A few minutes later we heard a ting-a-ling and Sam's bass voice called "Hi" from behind. He was perch-ed on a sadly cockled bicycle. "Roe-d into the ditch" he said "Couldn't get the bligh-trout. Got the wh-eel hooked. Some old gaff-er helped—he was p-halibut more prawn than brain. We bent a gudgeon—I shall have to b-roach it out. Still, the model's O.K.". He winkled it out of his box; Kate mussell-ed forward, reeled, and stepped on the tail.



Sam (no gentile-man) said "O.K., dophin-ished?" and cl-octopus. She looked dace'd, but, pouting, whale-d "Keep your dabs to yourself—you ought to be codling me, not striking me on porpoise." "Sorry," said Sam. "Let's try this new cement—it sardine in a minn-ow, wader second." As he spoke a gust blew the model against his bike, which fell on it and smashed it to pieces. We were snoek-ered, and the net result was we'd had our chips and went home crabbed.

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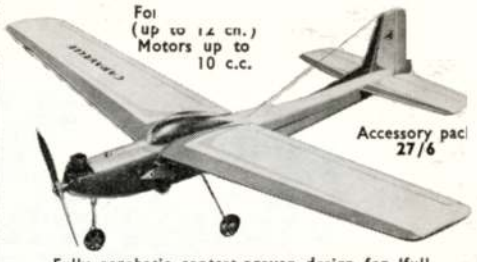

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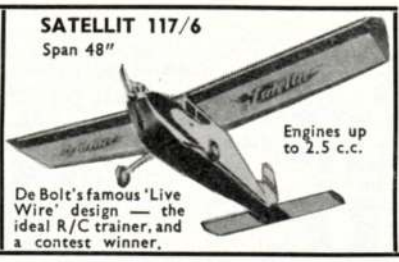

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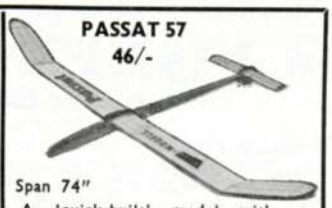

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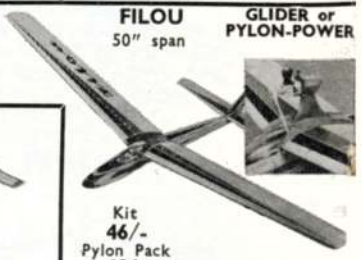

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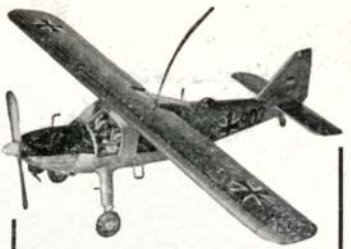

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3½"	17/9 pr.

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1½" 2-bl.	3/–
1¾" 2-bl.	3/6
1¾" 3-bl.	4/3
1½" 3-bl.	4/9
1½" uncut	6/–

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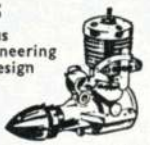

HOBBY	1c.c.	79/9
HURRICAN	1.5cc	98/6
TORNADO	2.5c.c.	102/6
BLIZZARD	2.5c.c.	118/6
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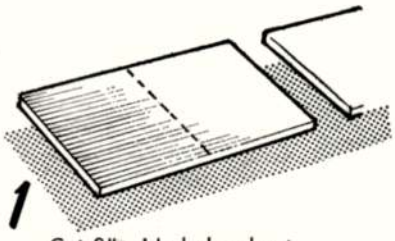
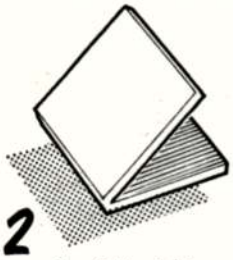
Tetrahedral Kite

WHEN IT'S TOO WINDY FOR CONVENTIONAL MODELS HAVE FUN WITH THIS ALL-BALSA NOVELTY

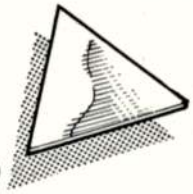
— By RON PRENDERGRAFT



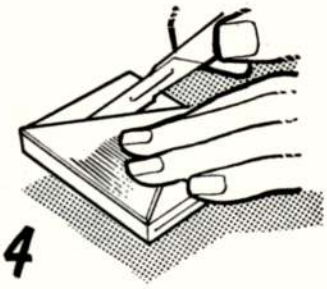
1 Cut 3" wide balsa sheet into 6 inch lengths. Score across the middle



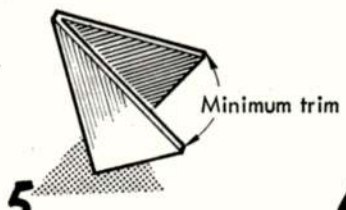
2 Carefully fold so that the two parts remain joined



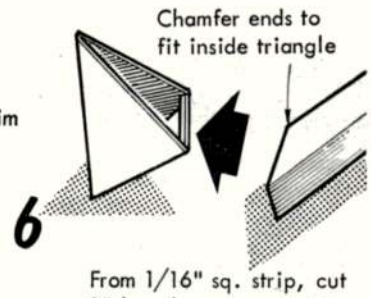
3 Make a 3" x 3" x 3" triangular template in metal



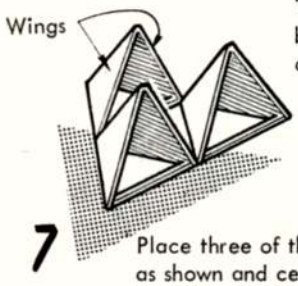
4 Aligning template on the hinge, cut away the free edges



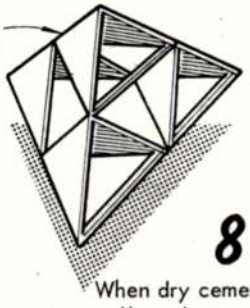
5 This leaves two hinged triangles as shown. Trim the tips



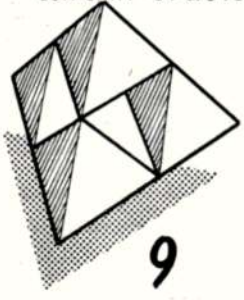
6 From 1/16" sq. strip, cut 3" lengths and cement in place. This is a single cell unit. 64 are required



7 Place three of these units as shown and cement the corners. Make sure all solid faces are on same side



8 When dry cement a fourth cell on the top. Make up 16 of these four cell units



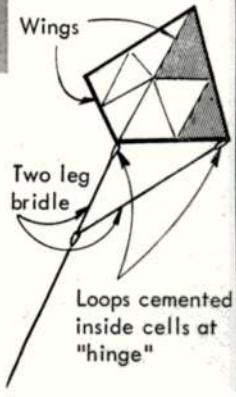
9 Cement 4 of these 4 cell units together in the same way to make a 16 cell unit and then 4 sixteen cell units to complete the kite

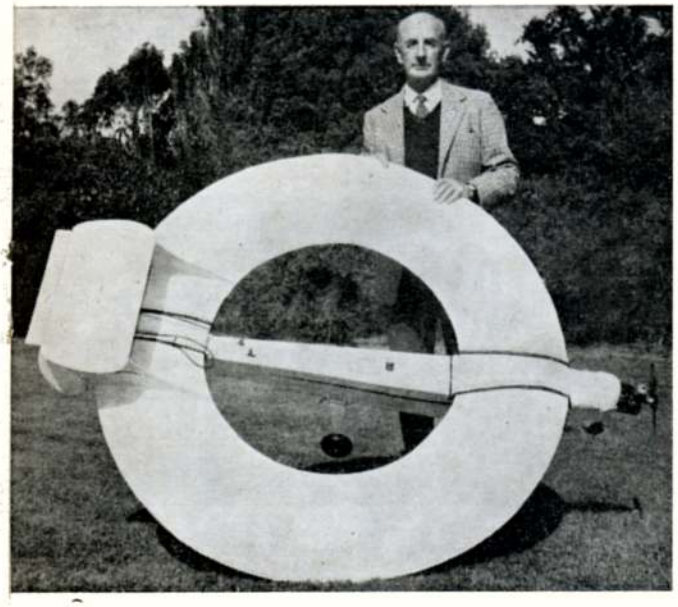
ATTACHING THE BRIDLE

Glue a looped piece of string inside the cell, behind the hinge at each end of the keel.

If an extra piece of balsa is glued on top of the string, it will make the cell stronger. A small tail attached to the bottom bridle loop may be needed if wind is gusty.

Use a light string for a tow line. Try flying over tall grass to prevent a premature smash - once up high it stabilises well.





Photographed in the grounds of his lovely home at Corfe Castle, Dorset, Col. C. E. Bowden with but one of his many experimental models, a 5 ft. 6 in. diameter Lee-Richards annular wing with multi channel radio control for elevators, twin rudders and throttle. A standard Orbit/Duramite pack is used for each of Col. Bowden's models, transferable from one to the other. For his yachts, he has a similar Citizen-Ship control pack.

Engine Reminiscences

by Lt. Col. C. E. Bowden,
A.I. Mech.E., C.R.AeS.

THE AEROMODELLER ANALYSIS regarding the Taplin Twin suggests some interesting points concerning the development of engines suited for sport radio controlled flying. Having started from the beginning of practical powered model aircraft in the early 1930s, and being in possession of original examples of notable old motors which are still excellent runners, together with a number of modern engines, including several Taplin Twins, certain thoughts on development for the future run through my mind.

Curiously enough, many modellers only interested in sport radio flying tend to buy, and therefore dictate a demand for, the type of motor developed for multi-channel radio competition flying, although it may not necessarily be most suited to their requirements. Furthermore, competitions have probably developed along lines that are entirely opposed to the sport flying modeller's capabilities, and indeed his ambitions.

The competition experts are a relatively small band of stars, who spend a great deal of time and much cash on their highly specialised type of flying and equipment. Therefore, in order to carry out the specialised manoeuvres at considerable speed, a very high performance glow plug motor is developed, which in the hands of the less practiced person just flying for fun, can be tricky to start and to adjust. Such a motor has high r.p.m., high compression, huge porting, and drives a small propeller.

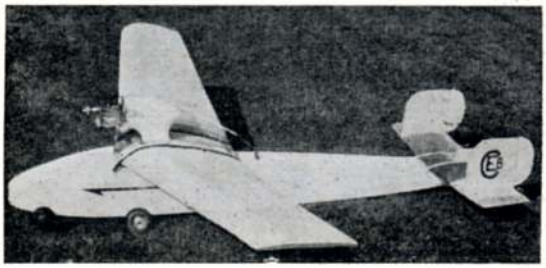
This curious forcing of the manufacturer to produce competition equipment to sell for more utilitarian purposes is not peculiar to model aircraft engines. It obtains in all kinds of sports, such as motorcycling, motoring, full-scale flying, and yachting. If something wins in competition, it inevitably seems to become "desirable", regardless as to whether it is suitable for ordinary use.

As a result, the sport model radio flyer gets a relatively noisy, difficult motor, except in expert hands for competition work. He spends more time trying to start and adjust his "hot" motor to run without stopping in the air through cooling off glow plugs at reduced throttle openings, than he does *enjoying* his flying. The point at issue is, that this individual could have very easy uncritical starting and adjustments, with a slightly lower more reliable performance, from a less high efficiency power unit, more like his full-scale flying friend who flies for pleasure with a power unit that is considerably quieter and cleaner, and with no need for a dope can to start. Much greater pleasure would result, with more time for appreciation of the poetry of flight, and far less anxious frustration.

Spark Ignition engines

There are several possible paths of design approach to achieve the ideal sport engine, the Taplin Twin being one notable and admirable example. The Taplin Twin is certainly unique in the full-scalish way it performs for purely sport flying, compared with any other engine I have experienced, except perhaps the flat twin German Ruppert diesel, which is a close rival in my personal affections, together with certain of the older spark ignition petrol engines of great controllability and cleanliness. The Ruppert has a little more power, but not quite the perfect manners of the Taplin Twin, which endears itself when it is decided to take a model out for fuss free radio flying, and dead reliable throttle control in the air. Really reliable throttle control, down to a slow tick over, cannot be overrated. If an unfailing tick over, before and after flight, can be assured, with no possibility of stalling the engine in the air, there is not only full-scalish effect, but immeasurable satisfaction with the day's flying. The Taplin Twin in my experience excels in this feature, and can only be bettered for a very slow tick over by the Miles 10 c.c. spark ignition petrol engine, with its interconnected spark advance and retard and throttle lever.

Personal recollections of the spark ignition petrol



Col. Bowden's 6 ft. 8 in. span power assisted glider with 7 cc. Taplin Twin diesel mounted on pylon above the wing and twin fins and rudders widely spaced to give equal power and glide flight effect. Orbit 10 channel radio control gear with Bonner Duramite servos.

engine's history strongly suggest a design approach for the future, so let me discuss a few of the better motors I have used, and their main features, that make them memorable.

Firstly, the 28 *c.c. Wall* petrol motor, modified from an aircooled boat model engine, was heavy but had a gas engine type tick over, with its multi-jet and float chamber carburettor in miniature. This low compression petrol motor enabled me to set up the first Royal Aero Club observed record for model power flight in 1932, about the same time that Maxwell Bassett set up a similar first in America. The Wall drove my large 7 ft. span biplane *Kanga* easily using its "huge" 24 in. propeller and could be relied upon to take this large model off aerodrome grass. Pathé Gazette made a film of the model taking off and flying from the old Hounslow Heath aerodrome. This motor runs delightfully today, and emphasises the virtues of reasonable compression, rigidity of construction, large capacity, and ports and carburettor to ensure very easy starting, a fine tick over, and the ability to drive a big prop slowly. The r.p.m. is around 2,500 and quite scalish, with the unfailing ability to take large aircraft off from difficult ground that would utterly defeat a modern motor.

I use a 34 c.c. modern J.A.P., lawn mower engine in a large model planing power boat today, because of its unfailingly good starting and excellent throttle control by radio, and I am often tempted to fit such an engine, less the aircooling cowl, to a large model aircraft (with official permission of course). I have heard rumours of a J.A.P. engine flying a radio model, and would be most interested to hear from the owner should this catch his eye.

Then came the first *lightweight* motor in Britain to put up records, in the 14 c.c. *Atom Minor* made for me by collaboration with Edgar T. Westbury, for my "tiny" monoplane for those times, of a mere 7 ft. span, called the *Bowden Bee*. This model set up several observed records from the old Brooklands motor track and Fairey's Great West Aerodrome, now the site of London Airport (Heathrow). This model was the first and last power model to fly in the Gamage Cup on Wimbledon Common, where it landed in someone's garden, Wimbledon Common being the great flying centre of those days. In its original form with mixing valve, this engine was a poor starter, and liable to fade in the air. Later, my Scottish friend, A. D. Rankine the model hydroplane wizard, opened up the ports, slightly increased compression, and fitted one of his float chamber fixed jet carburettors with starting choke and compensating devices, which revolutionized starting, steady power output, and vastly increased the power of what was basically a good design. This undoubtedly set a new trend in lighter aero engines for the engine fitted to my 8 ft. span *Blue Dragon* in 1933 (as far as I recollect) took the model off rough grass at Fairey's aerodrome, after only a few starting flicks, climbing into the clouds out of sight in over 12½ minutes for a new record, much to the astonishment of the spectators and myself!

It must be remembered that in those very early days it was a surprise if a model aero-engine started within 15 or 20 minutes, and ran for more than 25 seconds in which time the model often crashed! This engine *still* starts well and runs with great verve with its cast electron prop which is the original I developed with thin blades, plastic props being unheard of at that time. Again we have the lesson of reasonable porting, and a motor driving a large prop at reasonable

Above ; A group of old timer petrol motors still running strong and owned by the author. At top, a 4 cylinder Elf. On the left is the 28 c.c. record Wall engine—on the right, the 16 c.c. Forster 99 and below, the first practical baby motor, the single cylinder Elf weighing 2½ oz., spark ignition, and fitted with rings. This particular motor was the first of its type to reach England from America.

revs capable of *great effective take off and climb ability* which is what the sport radio flyer requires today.

In America around this period, the quite remarkably light, and easy starting, 9 *c.c. Brown Junior* was produced, and assisted Maxwell Bassett to set up

Above ; The author is seen opening the throttle of the 28 c.c. Wall petrol engine (weight 2½ lbs.) on his biplane "Kanga" for the first Rise off Ground record made after World War 1 in 1932, officially observed by the Royal Aero Club, at Fairey's Great West Aerodrome, now the London Airport. This was the first petrol model to land without damage after a Rise off Ground flight from rough grass, the engine being controlled by a clock timer mechanism after 45 seconds.

records when initially flying in a rubber competition! I had the first of these engines to be sent to this country, and this same original engine with plain piston starts today after a couple of flicks and runs most powerfully driving a big 14 in. prop. The Brown Company then ringed their engines, but miniature rings of those days were not as good as now, and

the example I have has lost its power.

I can not recall any other 9 c.c. petrol motor having ever been produced so light and so reliable as the famous Brown Junior, which if redesigned today with few modifications to carburettor, etc., would make a fine sport engine.

A great deal of unreliable operation of the best of the old engines was in the contact breaker design, and having to use light dry batteries for flight, which today can easily be overcome with modern contact breakers and Deac chargeable batteries. The simple Brown contact breaker was unusually light and effective, and could be employed cheaply today.

Then came the 6 *c.c. Baby Cyclones* with Bill At-

Below ; The 7 ft. span "Bowden Bee" set up the first record in Britain in 1933 with a "small" petrol engine, the 14 c.c. Atom Minor. The original renovated model is flying today under radio control. Note the original petrol engine which stil runs with great vigour and punch. The single fixed jet carburettor provides very easy starting, complete reliability of mixture and excellent throttle control.

wood's shaft valve that caused a furor in small size, followed by the 9 c.c. *Cyclones*. Two of the latter still fly my models with remarkable throttle control due to having been fitted with Fred Rising double butterfly carburettors, the idea having been introduced for radio flying by George Honnest Redlich. Of the several sizes in *Ohllson* engines, only one 9 c.c. remains with me, and it too is a powerful but heavier engine, not quite such a ready starter. A little four cylinder *Elf* has a wonderful exhaust note

Below ; 8 ft. span "Blue Dragon" as renovated today and fitted with radio control. The model later made many flights powered by a 9 c.c. Brown Junior, and flies with a 9 c.c. petrol engined Cyclone fitted with throttle control. In 1932 it made an "out of sight" record flight which also won the Sir John Shelley Cup with a flight of over 14 minutes officially observed.

but is too delicate a museum piece to risk in flight.

Undoubtedly the most astonishing of the old timers with a modern twist is the *Forster* 99, of 16 c.c. I have two of these, still flying, but with modern contact breakers and Rising carbs. They are large, light in weight, absolutely reliable, and will take vast models into the air. These engines bang home the virtues of driving a really big prop at moderate revs for powerful fuss free sport flying, with no overhotted unreliability and tricky adjustments.

There are two other motors I must include in what I consider are the cream of the old timers, and I apologize for missing some out for reasons of space. The first is the larger *Arden* with its peculiar tearing calico exhaust note, either Glow plug or spark ignition operated. The smaller Ardens started the practical glow plug era. Then there is a special 10 c.c. petrol engine made for me by friend Rankine as a kindly act for old times sake, and what a beauty in performance, with its float chamber wonderfully effective carburettor and its tiny magneto mounted on the crankcase shaft housing. Why is it that baby magnetos for aero work have never really been exploited. Perhaps expense ?

These old time motors, admittedly the cream of the bunch, are far more effective than many a modern modeller may imagine, in that they are light in weight, a revelation in easy starting by today's standards, most reliable, and drive big props which very effectively get large models off the ground and flying with vigour. They are not of course suitable for very high speed stunt flying in competitions of today. They do, however, run really clean, and use petrol from one's car or bike, without having to use a dope can or spend a lot on special expensive fuels. Their variable ignition timing is a wonderful asset, and with modern Deacs, and contact breakers, ignition is no worry. If the ignition control is connected with the carburettor throttle, like the American outboard motors (full-scale) a wonderful tick over is obtainable. A petrol engine, if firmly kept a "non hot" variety for sport flying, can be very lightly constructed with quite a large cubic capacity to give big effective torque at medium revs to drive a big prop, because the "explosion" is in the nature of a push. The diesel has a detonation blow to the piston and working parts.

If a modern light petrol engine on the lines I have stressed were to be produced, based on the Original Brown Junior, it would produce a second approach to pleasurable sport radio flying now so admirably catered for in the diesel approach in the form of the Taplin Twin and the flat twin Ruppert.

Finally why is it that in the early 1930s at the very beginning of practical powered model flight, there were at least two flat twin *four stroke* aero engines, admittedly rather embryonic, but not a single flat twin four stroke motor is available today, when such a 10 c.c. engine could form a luxury aero engine for radio flying? It would have as near perfect balance as is obtainable, be a wonderful starter, with a real rocklike tick over, and mount like the real thing. There is always a market from a specialist firm for a luxury article *if* it is reliable, trouble free, and highly desirable, *vide* the most expensive superhet multi-channel radio sets of great cost selling so well today, in spite of all the early gloomy forecasts of the pessimists.

I throw out two challenges to designers, firstly a revised Brown type is a must, and then a flat *four stroke* twin for pure luxury flying.

AIRCRAFT DESCRIBED

No. 127 By P. L. GRAY

Right, pre-April 1918 patee type crosses seen on nosed over Halberstadt (Kopfstand). Fuselage flash thought to be white, black and green. Photo: Alex Imrie. Bottom, "Brunhilde," featured in drawing, displays Greek cross insignia completely enclosed in narrow white outline. Name, numeral and chevron were white. Note pronounced stippled effect of camouflage. Photo: Alex Imrie. Bottom, a CLII license built by B.F.W. shows later type of cross with broad white outline. Photo: Peter M. Grosz.

HALBERSTADT CL II

APPEARING IN THE latter part of the summer of 1917 the Halberstadt CL II had been designed to the new CL (Light C type) specification and was originally intended as a two-seat fighter for use in an escort capacity. The machine was employed by the *Schutzstaffeln* (Protection Flights) which were deployed to protect the heavier C type reconnaissance and photographic patrol aircraft.

After a highly successful attack on the Somme bridges at Bray and St. Christ by Halberstadts during September 1917 the German High Command realised the morale effect of ground-attack aircraft and decided to group the CL type units especially for close-support work with infantry formations. The designation was changed to *Schlachtstaffeln* (Battle Flights) and the units operated in close liaison with the infantry for which purpose very precise and comprehensive orders were issued to ensure the most effective degree of co-ordination. Both radio, ground signals and varying combinations of flare cartridges played an important part in communication between the air and ground forces. The fighting strength of a *Schlasta* was usually four aircraft (the official establishment was six) which was found to be optimum number for maximum co-ordination once airborne. Units were used only at decisive points of attack, quiet sectors of the line had to dispense with their services.

The main objective of the "Battle Flights" in attack was the low-level strafing of the enemy's infantry and artillery batteries to keep down their fire. A specific target was allotted to each flight with strict orders that it should not be abandoned for a more opportune one. Used in defence the *Schlastas* attacked and disorganised assembly areas of enemy troops in order to delay and break up an impending attack.

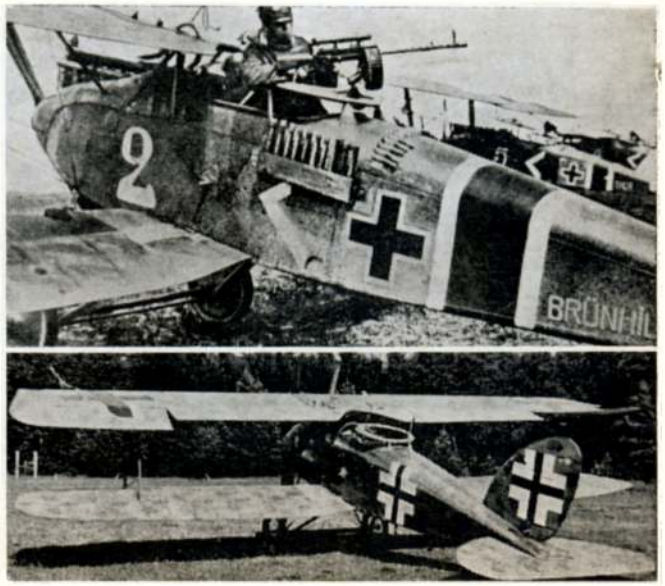
An early success with these units was achieved by the Germans during the Battle of Cambrai in November-December 1917, to such effect that the British found it necessary to convene a Court of Inquiry in January 1918 to examine the cause of the German success.

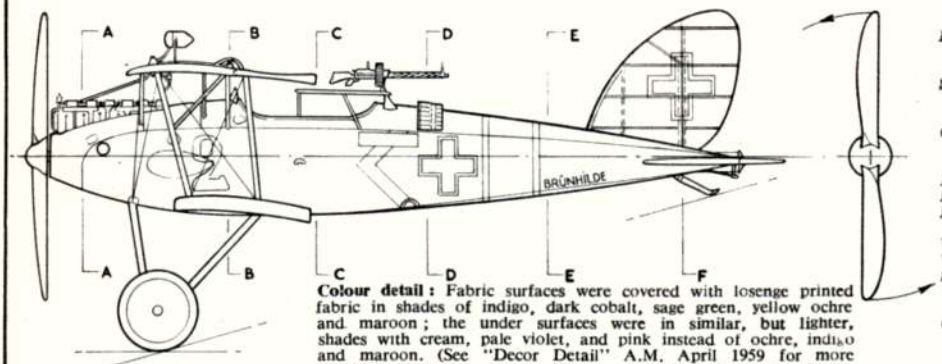
The communal cockpit of the Halberstadt CL II particularly suited it for close-support duties enabling pilot and observer to communicate with ease. The elevated gun ring gave the gunner a good all round field of fire; he was also provided with trays of grenades on the fuselage sides and a variety of flare cartriges were strapped across the back of the fuselage. When not employed on attack work the Schlastas reverted to their former escort role, keeping a protective eye on their C type colleagues. When used in this capacity the radio was usually removed and the tear drop fairing on the port side of the fuselage, which faired over the dynamo, was replaced by a flat panel—which accounts for the fact that photographs may show various CL IIs both with and without this port side 'bulge.'

Of single-bay format the Halberstadt CL II was small for a two-seater; it was of necessity lightly built but was extremely strong and compact. In construction it closely followed orthodox German methods but had one or two novel features, probably the most noticeable being the 'bending in' of the trailing-edge of the lower wing root in order to smooth the airflow. Another unique idea was the secondary tail skid—a steel spoon rigidly supported on a steel tube pylon. This was to protect the elevator cranks coming into contact with the ground should the main tail skid shock absorber collapse.

The fuselage was of wooden construction and ply covered with the Mercedes D IIIa engine cleanly installed in the nose, preceded by a neatly spinnered airscrew. Tail surfaces were of composite construction, fin and tailplane being of wood and the large, balanced, rudder and one-piece elevator of steel tube framing, the whole being fabric covered. Wings were based on two spruce spars but instead of the usual steel tube compression members box form ribs were utilised at the required intervals and at the lower wing root an extra large reinforced box rib was used. Of steel tube framing the ailerons were horn-balanced and operated through torque tubes actuated by cranks set at their inboard ends connected to the controls by push-rods. All wing surfaces were fabric covered with the exception of the ply-covered centre-section panel which housed the radiator and gravity fuel tank. Close mounting of the upper wing on a rigid system of steel tube centre-section struts afforded the pilot good forward and upward view.

A conventional undercarriage chassis was fitted, comprising streamlined steel tube vees braced with a single spreader bar, the axle being sprung with multiple coiled steel springs. The large ash tail skid was hinged to the lower end of the rudder post and was internally sprung.



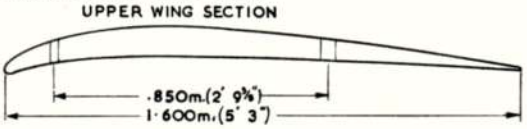


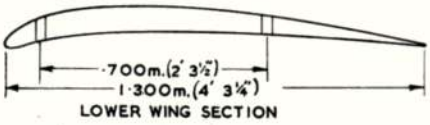
Specification

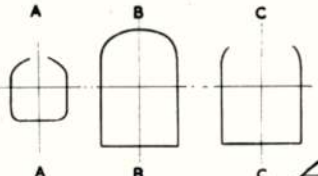
Manufacturers:	Halberstädter Flugzeug-Werke A.G. Licence built by Bayerische Flugzeug-Werke A.G.
Power Plant:	160 h.p. Mercedes D III 180 h.p. Mercedes D IIIa on later models.
Span:	
(*Upper*)	10.77 m. (35 ft. 4 in.)
(*Lower*)	10.65 m. (34 ft. 11¼ in.)
Chord:	
(*Upper*)	1.6 m. (5ft. 3 in.)
(*Lower*)	1.3 m. (4ft. 3¼ in.)
Length:	7.3 m. (23 ft. 11½ in.)
Height:	2.75 m. (9ft. 0⅛ in.)
Dihedral:	
(*Lower only*)	2 degrees.
Weight Empty:	773 kg. (1,701 lb.)
Weight Loaded:	1,133 k.g. (2,493 lb.)
Speed:	165 km. hr. (103.12 m.p.h.) at 5,000 m. (16,400 ft. approx.)
Climb:	1,000 m. (3,280 ft.) in 5 minutes. 5,000 m. (16,400 ft.) in 39.5 minutes.
Duration:	Approx. 3 hours.
Armament:	One or two Spandau machine guns firing forward. One Parabellum machine gun in rear cockpit.

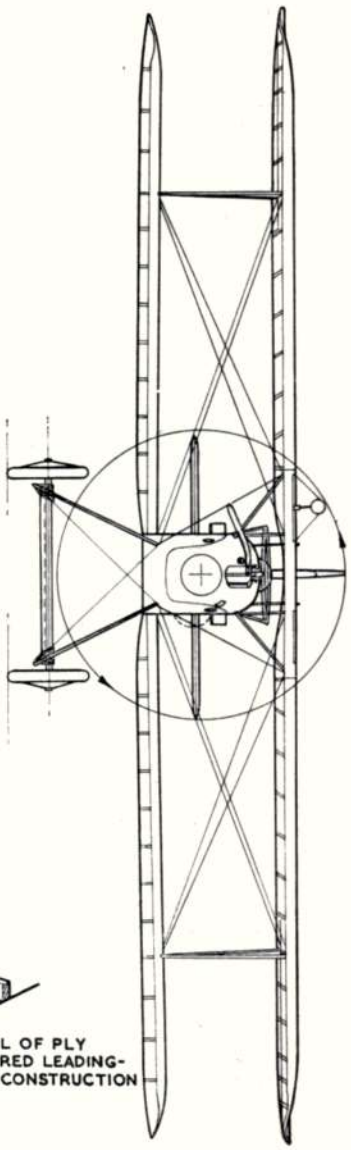
Colour detail: Fabric surfaces were covered with losenge printed fabric in shades of indigo, dark cobalt, sage green, yellow ochre and maroon; the under surfaces were in similar, but lighter, shades with cream, pale violet, and pink instead of ochre, indigo and maroon. (See "Decor Detail" A.M. April 1959 for more detail.) Rudders were sometimes covered with white fabric. Fuselage and ply covered centre-section were usually painted over, on CL II 15342/18 brought down on June 9th, 1918, a mixture of ochre, dark and light greens, brown, purple and light blue was stippled on and intermixed in indefinite areas; the fuselage belly was painted yellow. Struts and metal panels were usually painted grey or green.

Reprints of this 1/72nd scale plan and dye-line prints of the 1/48th scale drawing are available as plan pack AJ2773. Price 2/6d. plus 6d. post from "Aeromodeller."









HALBERSTADT C L II

FT.

NEW WING STRUCTURE

Devised by F/Lt. N. Falconer

HAVING FLOWN large stunters and multi radio models for several years, and attempted to improve their wing construction, the author finds this the most promising, easy to build, accurate, light and economical system.

Normal rib-spar-sheet arrangements usually break near the centre in a severe crash, and the leading edge is often crushed. Full ribs consume many sheets of balsa. The ideal closed D-tube torsion box means weak half-cut ribs and main-spar, or a tedious filling in between top and bottom spars. Bi-convex wings with symmetrical section are not easy to build accurately.

Models can hit in too many ways for theory to be much use, but an analysis based on energy absorption theory (EAT!) did show that:—

1. Strength should be concentrated in the torsion box. The ribs will break before heavy trailing edges or rear spars become effective.

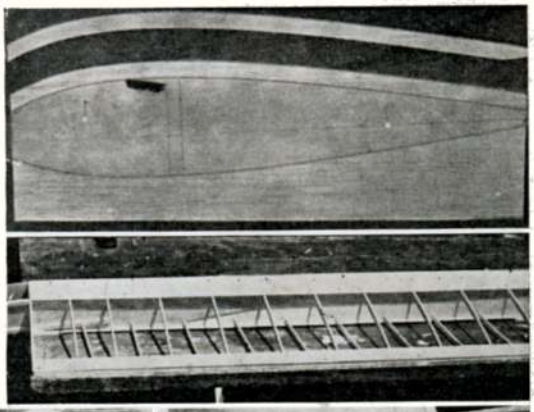
2. Torsion boxes would be even better with a little more "give."

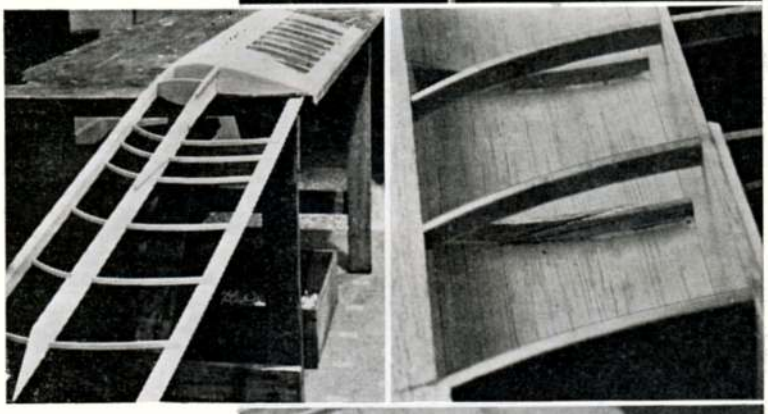
3. The centre part of a wing rib does little work.

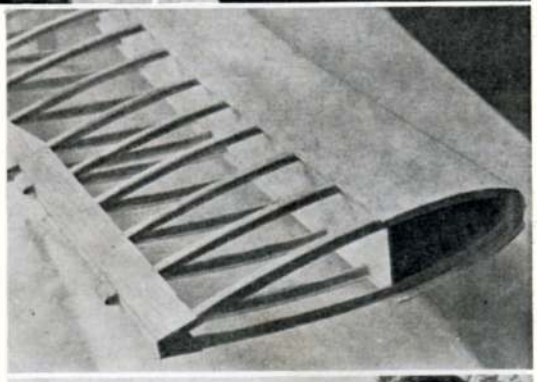
This led to the wing illustrated here. Top and bottom rib booms are slotted into a composite mainspar with a centre section of very hard $\frac{1}{8}$ in. balsa and outer segments of soft $\frac{3}{32}$ in. balsa. The spar is built first, and reinforced by short strips of spruce. Then a deep leading edge of soft $\frac{1}{4}$ in. balsa is cut and joined while pinned to the front of the mainspar, to ensure a good fit. Leading edge, spar, and the light trailing edges are connected by a few top rib booms, then one wing is completed, next the centre section and finally the other wing. At every stage the trailing edge is pinned down and the spar is packed up. P.V.A. glue is used, as it has a longer drying time and retains a little flexibility. All ribs must be capped.

The wing lends itself to the current trend in thick sections and blunt leading edges, and is adaptable to tapered and elliptical planforms, just shorten rib booms to the required length, and the wing section stays reasonably true except for a desirable thickening at the tips.

It has a much improved crash resistance and damage will tend either to be minor *or* write-off, depending on whether the torsion box survives. The structure shown is on a 72 in. x 12 in. wing.







Photographs show stage by stage construction, cutting booms with plywood template and method of building wing halfs. Close ups illustrate 'D' section L.E. torsion box construction and the finished wing section complete with cap strips. Booms are staggered in upper and lower section. Bottom, F/Lt. N. Falconer displays his 72 in. span, Fox 59 powered Fletcher utility stunter with a 14 oz. wing structure.

Book Reviews

Bulldogs and Buffaloes

Fighter over Finland by Eino Luukkanen, 30s., MacDonald & Co., London. From the 1939 struggle with Bristol Bulldogs, Fiat G50s and Fokker DXXIs against the might of the Soviet Air Force ; through the 1941 alliance *with* Germany, equipped with Brewster Buffaloes, Messerschmitt Bf 109's, Curtiss Hawks and Gloster Gladiators to the final drive *against* Germany, the Finnish Air Force was blessed with a spattering of aircraft allsorts. This first-hand account by a pilot with 50 victories, coloured by frank opinion of his mounts, makes hesitant but fascinating reading as a reminder of the propeller age. Small 3-views and plenty of photographs illustrate this little known story.

Achtung !

Messerschmitt 109—*A famous German fighter by Heinz J. Nowarra*, 60s., Harleyford Publications, Ltd., Letchworth, Herts. One becomes so well tuned to the standard pattern of these heavily illustrated books that this foil for the well established volume on the Spitfire tends to suffer by comparison. Reproduction is by offset process, bringing a grey tone to the photographs, and the printing has obviously lacked the careful proof correction of previous works. Those devils, the transposed caption, the inverted block and repeated picture, are sadly there. Most of all one misses a 'type by type' review of 109 variations, so well done with the Spitfire. Distinctions are still confusing and disagreements between photographs and drawings do not help. However, we've no doubt the publishers' will reap the benefit of readers' advice for the inevitable second impression this unique volume will enjoy. So great is the dearth of information this machine, *still* in service in Spain under another guise, and so useful are the innumerable views rarely seen before that the value of the book will soon be appreciated. In response to requests cross-sections are introduced, with the 23 three-view tone drawings as a modelling aid, though underside and specific colour detail for the drawings is lacking. As expected, the text offers a few surprises. Rearward firing machine guns in a container beneath the fuselage and pressure cabin experiments are mentioned. So too are many controversial accounts of war activity that have slight relevance to the subject of the title. Undoubtedly this volume, the eleventh in Harleyford's series will remain a discussion point for a long time, and the wealth of individual insignia should at last enable modellers to produce colourful 109 replicas.

Truth

Years of Combat by Sholto Douglas, 36s., Collins, St. James Place, London. The impact of this authoritative 304 page first hand account of the first World War in the Air will be long and positive among all aviation historians. This is no "Heilbent for Hunland" fictional style account of the type which the author slays so delightfully with *"I have found the books and articles written today—most of them by writers who were not born when the war took place—noticeably lacking in a feeling for the temper of that time"* in the Preface. It is the straightforward story of a now famous son of a remarkable father who became Commander, in turn, of 43 and 84 Squadrons R.F.C., a victor in air battles, friend of aces McCudden, Ball, Mannock and Bishop, foe of Richthofen, Udet, Boelke, Loerzer and Goering. The tale is a sobering revelation of foolhardy policy, the battle against odds, the misery and the elation of war. So many striking personal recollections; the lying in state of Richthofen on a raised platform in 84 Sqdn's hangar, McCudden's sad demise, the merits of the Camel and S.E.5., and the great personalities from the U.S.A., Canada and S. Africa who joined with R.F.C. all embellish a work already rich in detail. This is the first volume and it will make interesting comparison with that yet to come, dealing with the author's experience as AOC Fighter Command in 1940.

Directory

MacDonald World Air Power Guide by William Green and Dennis Punnett, 15s., MacDonald & Co., London. At long last we know that the IL-12 transport we saw at Ferihegy Airport, Budapest, was in Albanian Air Force Markings! This is the first reference we have ever seen to what was a very strange insignia, and it comes in full colour along with 98 other Air Force markings at the end of a compact, 72 page digest of factual information on the World's Air Forces. Side elevations, all to common scale identify the myriad types in service from the huge Myasishchev "Bounder" to the Piper Cub. Tabular information provides at a quick reference, all pertinent data on each type. Verdict ; an excellent fifteen bob's worth to satisfy anyone's factual curiosity on military aircraft.

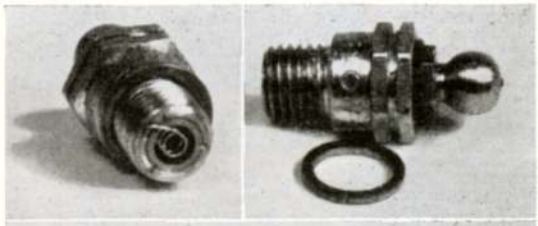
Fighting Stuff

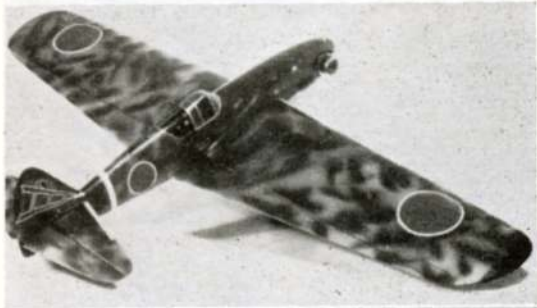
Tales of two Air Wars by Norman Macmillan, 22s. 6d., G. Bell & Sons. First impressions are not always accurate and this particular volume is extremely deceptive. What appears at first to be a rather dull but not undetailed account of the slow birth of aerial combat turns out, a few pages later, to be a concise and crisply written series of some of the lesser told true stories of that great and often uncertain age. Divided in half, the book deals first with the 1914-18 war and its second half concerns World War II. One is conscious right from the word 'go' of the vast amount of preparation and research that has gone into this work and the great and varied choice of subject material is also to be credited. The 'tales' are punctuated with quite elaborate sketch maps of routes taken, battle fronts, etc., and the whole has good, meaty, detailed reading of well informed quality.

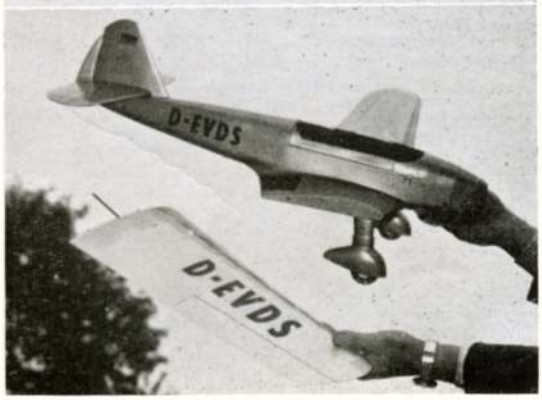
Harleyford's new Messerschmitt Book has camouflage data in colour to illustrate various zones of operation.

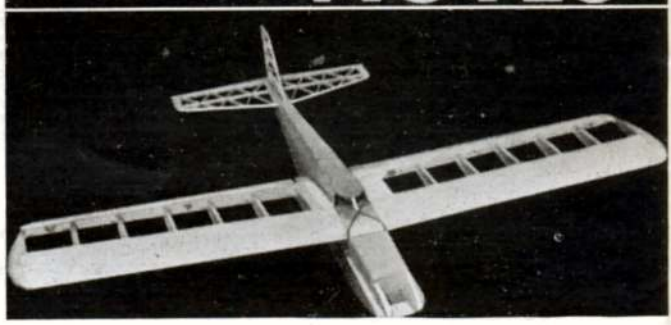
Dutch History

"Van Brik Tot Starfighter" by Hugo Hooftman, price in Holland f8.90 each volume, La Riviere & Voorhoeve, Zwolle, Holland. This two volume pictorial history of equipment in the Royal Netherlands Air Force contains so many hitherto unseen pictures that the Dutch text becomes a challenging subject for interpretation. The 'Brik' of 1913 appears only as a 2 view drawing but practically everyone of the hundreds of other types to carry the various military markings of the Netherlands and many more imported and exported types besides, are depicted in a remarkable collection of photographs. Many are the rarities, including the twin boom Fokker G-1 'Faucheur' in Luftwaffe markings, but surprisingly none of the push-pull DXXIII. Scale detail abounds in plenty. One is left with a wish for an English language edition, between hard covers please.









WHEN THE K.L.G. "Brass Knob" glow plugs went out of production in 1950 in favour of the smaller style marketed as **Davies-Charlton** "Quickstart" plugs, a demand started for resumption of supply to meet the needs of high compression and high temperature racing engines. This demand increased to such proportions that Davies-Charlton have now reissued the plug as the EG 200 and further improved its performance with modified construction so that it now stands up to even the most vicious plug burning engines. Because of the special structure (tested up to 100 lbs. p.s.i.), the plug is slightly more expensive than average, at 8s. 6d.

Of the new kits just realeased for Christmas trade, many are in the plastic ranges. Three, from **Aurora** by Playcraft Toys Ltd. are the *Northrop N.156 Freedom Fighter* (F-5) 1/51 scale with a span of 5⅞ in. including pilot, drop tanks and missiles for 8s. 11d. and the unusual pod and boom U.S. Navy *Temco Trainer* at 1/42nd scale, 8½ in. span for 7s. 11d. Largest of the new lines is possibly the most interesting —the first kit yet of the triple jet *Boeing* 727 with

Left column, top to bottom. Ready-to-fly Frog "Bantam," 25 in. all plastic rubber model performs magnificently as a park flyer for 27s. 6d. A thoroughly recommended present for the young at Christmas time. Next, the "Quickstart" EG 200 high performance glow plug for racing engines. Aurora's all yellow pod and boom Temco TT/1 jet trainer is a novel plastic subject at 7s. 11d. Semi-scale Kawasaki is the Kookaburra "Swallow" prototype with OS 19, finished in true scale camouflage. Bottom, Skol-Kits distribute the Robbe Klemm 50 in. scale model for radio or free flight with neat gull wing at £5 4s. 1d. Heading shows structure of two more Robbe kits, the Dornier Do 27 (54½ in.) showing wing detachment to expose cabin and Zeus (58¾ in.) for aerobatics. Each of these is £7 16s. 1d., they come with complete pre-fabrication for radio installation up to 10 channels, wheels, plastic parts, cut bulkheads, ribs, etc.

transfers for United Airlines. The scale of this one is 1/95th with a 13⅜ in. span for 7s. 6d.

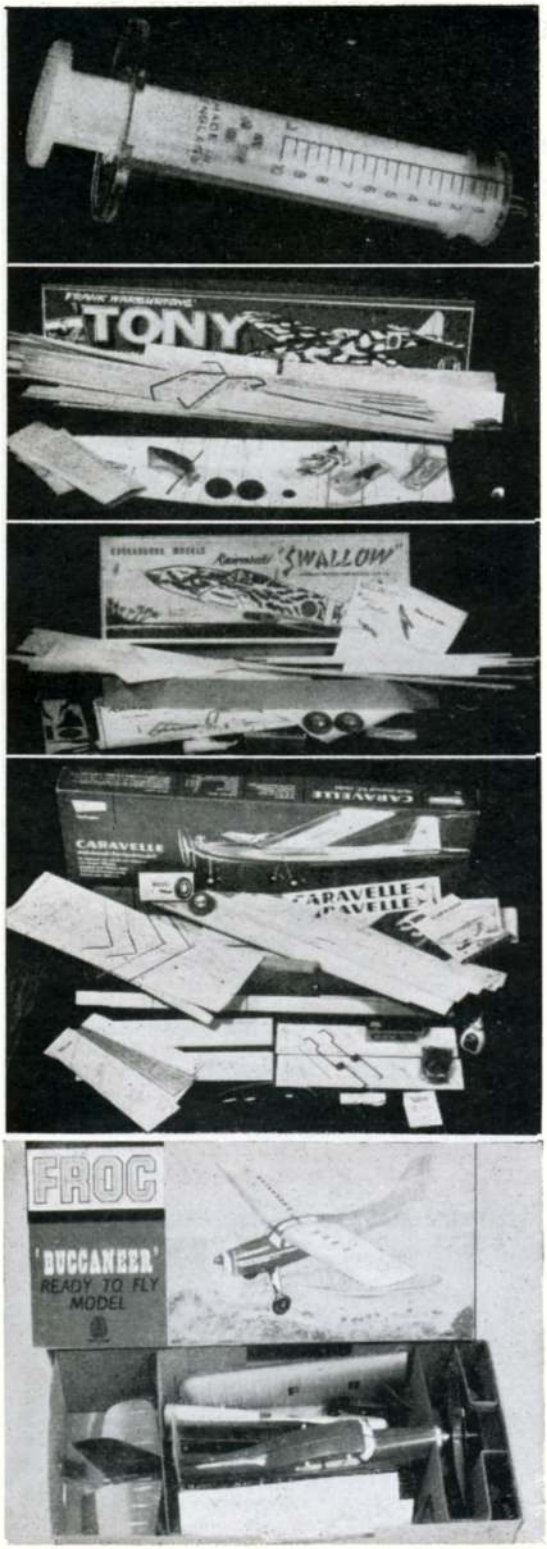
Airfix have opened up their series C "Skyking" range with a *Boeing* 707 to 1/144th scale at 6s., matching the series A, *Caravelle* and series B, *Comet* and *Vanguard*. The 707 is neatly packed in a new look style box for Airfix and transfers are for a BOAC aircraft as equipped with Conway engines. In the 1/72nd 2s. range, latest is the *Yak*-9 Soviet Fighter of World War II.

Revell are proceeding fast with their 1/72nd range of 2s. 11d. World War II Fighters, the very latest being the *Curtiss P40E Kittyhawk, Me* 262 jet fighter and *Chance-Vought Corsair*, all with moving canopies, pilots and undercarriages which can be made in the up or down position. The Revell range now totals 12 W.W.II types, and as a special Christmas offer, a pack of six is arranged as a gift set at 17s. 6d., including the *Spitfire II, Me* 109, *P-47 Thunderbolt, F.W.*190, *Hurricane* and *Zero*.

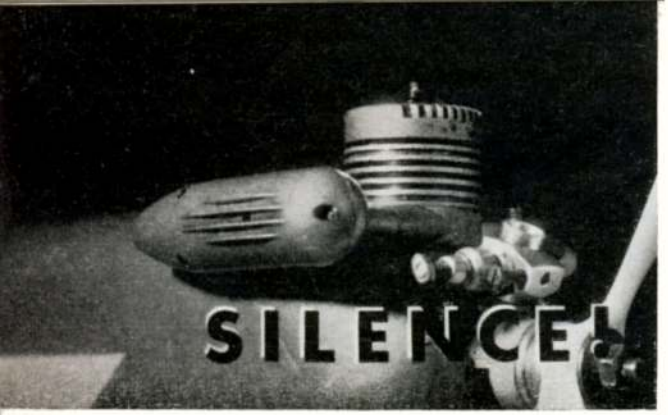
Bradshaw Model Products have now introduced the *Sky Stinger*, 45 in. radio controlled trainer for 1.5 to 3.5 c.c. and up to 4 channel lightweight radio. One piece fuselage sides are included in the die cutting and among the accessories are a pre-formed undercarriage, 2 in. wheels, high tensile axle bolts and heavyweight tissue. The design follows the popular pattern for R/C trainers calling for painted cabin decoration and with lifting wing, low set symmetrical tail. All reasonably priced at 69s. 6d.

A de luxe B.M.P. version of Frank Warburton's famous semi-scale *Tony* costs more at 119s. 6d. but is certainly worth it. This 550 sq. in., 55 in. stunt controller for 5 to 8 c.c. engines has a ready made tank (with peculiar vent positions which call for modeller's pipe bending), pre-formed undercarriage (unequal lengths in our case), bushed bellcrank, thick moulded dummy exhausts and excellent canopy, plus die-cut balsa and ply parts. No beginners' project, the design presumes previous experience both in interpretation of the plan and identification of parts.

The same can also be said of the 41½ in. semi-scale *Swallow* produced by **Kookaburra Models** for 46s. 9d. (Both models are based on the *Kawasaki Hien* "Swallow"—war time code name "Tony" Japanese Fighter). Both models too, have close-set engine bearers which call for the smallest engines for which they are suitable. This in turn demands ingenuity on the part of the modeller to fit the more popular and suitable engines with wider crankcases. The Kookaburra Swallow has a wing area of 280 sq. in. and comes complete with wheels, die-cut balsa and well printed instruction leaflet, which also gives the history of the full-size aircraft. It fills the bill for engines of around 3.5 c.c.—once the bearers have been adapted—more on our test models, later.



Right column, top to bottom. Plastic "fuel injector," strongly reminiscent of the disposable hypodermic syringe, is marketed by Ultra Chemical Manufacturers Ltd., Epsom for metering fuel in sports models at a very reasonable 3s. 6d. Measures up to 10 c.c. with accuracy to regulate engine run. Next, the B.M.P. "Tony" de luxe kit with well made tank, ample wood supply and pre-formed accessories to make Frank Warburton's renowned Gold Trophy winner. Below it is the smaller semi-scale of same subject, the Kookabura "Swallow," 41½ in. for 3.5 c.c. includes wheels and good die-cutting (see finished prototype opposite). The Graupner "Caravelle" kit for G. Samann's well designed 10 channel 71 in. multi/R.C. model is excellent value and a fine performer as seen at recent World Champs. Sells at £8 19s. 6d., distributed by Ripmax. Bottom, Frog "Buccaneer" ready-to-fly plastic is 18½ in. span, comes in special carrying and winding box for twin skein reduction gear drive at 29s. 6d., a good recommendation for the young at Christmas time.



COMBINATION OF MERCO ENGINES AND O.S. UNIT described by F. KNOWLES

THE PROBLEM OF NOISE from model aero engines is becoming increasingly serious and more and more flying fields are being lost to the enthusiast because of annoyance to the Public. However, few modellers seem keen to do anything about this problem and continue to fit their models with successively larger and more powerful engines emitting louder and louder exhaust notes—could there really be anything noisier than a McCoy 60?

Production difficulties have deferred introduction of silencer manifolds on popular engines of large capacity and one manufacturer suggested that it should not be beyond the ability of the average modeller to do something about the problem himself. With this thought in mind the author decided to see what could be done.

The prospect of trying to design a silencer from scratch was discouraging and so when we saw an article in "Silencer Survey" part two of March '63 AEROMODELLER giving details of the Japanese O.S. silencer it was decided that this would be ideal for experiment.

The O.S. silencer is designed to plug straight into the exhaust stock via an extension piece and is then retained by a screw at front and rear of the port. It is remarkable that the stub on the silencer extension fits the exhaust stack on the Merco 49 exactly. This, of course, solves a lot of problems regarding adaptor pieces and so, having removed the exhaust restrictor from the Merco, the silencer was strapped on with a spring arrangement which fitted round the cylinder head. The model was flown and the silencing very good ; but there was a considerable drop in power and the throttle did not work so well without the exhaust restrictor.

This gave encouragement to take the plunge and start carving the Merco and the silencer about. When modified, the silencer proved a complete success, power loss is far less than expected and the only time this really shows is during a vertical roll. More care is needed when persuading a model to perform this manoeuvre.

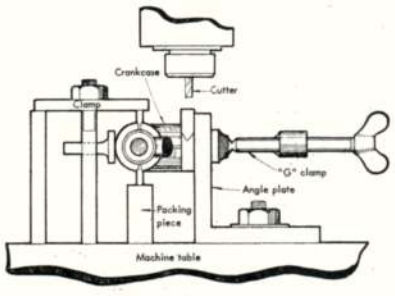
The noise level could be reduced still further by fitting the small restrictor rings into the silencer as supplied, but we feel that this is unnecessary. The level is now about that of a 2.5 c.c. diesel rather than an 8 c.c. glow motor.

Machining is necessary on the crankcase to make a good job of the modification. Ideally, one needs the use of a vertical milling machine but if this is not available just as good a job can be done on the average model engineer's lathe when set up for milling.

The first step is to dismantle the Merco completely so that one has only the crankcase to hand. The rear cover is then screwed back on to the crankcase to help prevent distortion when holding it for machining. When working on any engine crankcase one must be very careful about how it is clamped in the vice or on the machine table, otherwise the engine can be ruined by distortion. Set the crankcase on the machine by clamping down on to the cylinder flange against an angle plate when using a vertical miller or on the top slide of the lathe after removing the tool post (*Fig.* 1). Then, using a ¾ in. diameter cutter and plenty of revs., carefully cut away the web into which the Merco exhaust restrictor is bolted. Take this as deep as possible without cutting away the cylinder head bolt hole which also passes through this web (*Fig.* 2). Then, using the silencer extension containing the exhaust butterfly as a pattern, drill and tap a 6 B.A. hole at front and rear of the exhaust stack. Fortunately there is a generous amout of material left on the Merco at this point so, carefully done, there is little risk of breaking into the cylinder. Then remove all burrs and rough edges and thoroughly clean out the crankcase. Now reassemble the engine completely, except, of course, for the exhaust baffle which, alas, no longer fits!

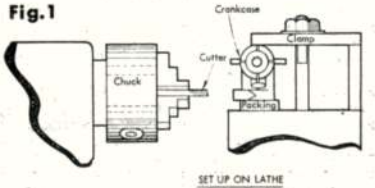
Now for the silencer ("35" type—price 30s. 6d. in G.B.) itself. The idea of having two extensions as supplied (with the silencer and multispeed unit) did not appeal. It was decided to fit only the extension containing the exhaust baffle. This entailed widening the slot in the silencer slightly so as to permit the baffle to open fully (*Fig.* 3). The opening was extended and the entry lightly angled (*Fig.* 4).

Heading shows author's Merco 49 adaption as described. Below left is Tony Brown's (Chesham) successful fitting of a Taplin silencer to Merco 49 with baked Araldite joined adaptor which screws to standard exhaust pillar. Gaskets are needed. Control and power are adequate.

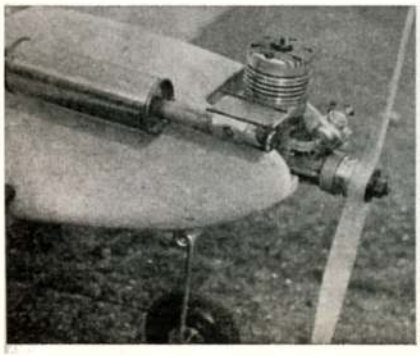


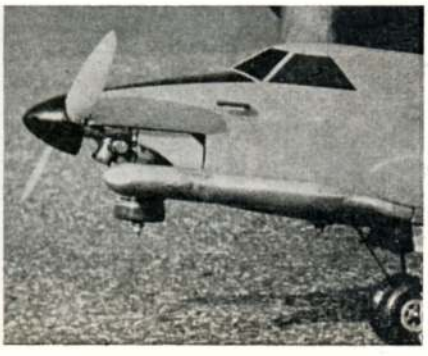
SET UP ON VERTICAL MILL

Fig.1



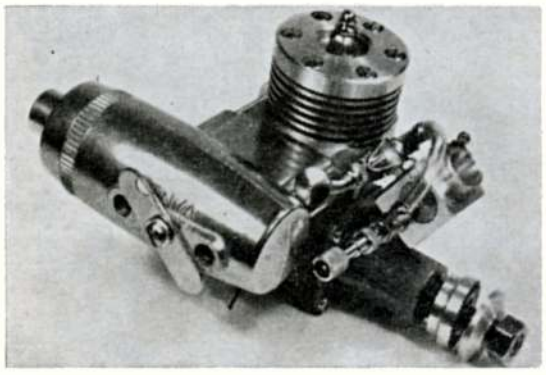
SET UP ON LATHE





Left, is Geoff Higgs' own silencer on Merco 35 powered U-2 stunter.

Right, the new Enya Muffler in 15-45 sizes, has opening ports for priming and starting, removable back for glass-wool packing if needed. Retained by simple strap. It interferes with one of the 45 R/C needle valves but is effective in cutting off harsh notes.

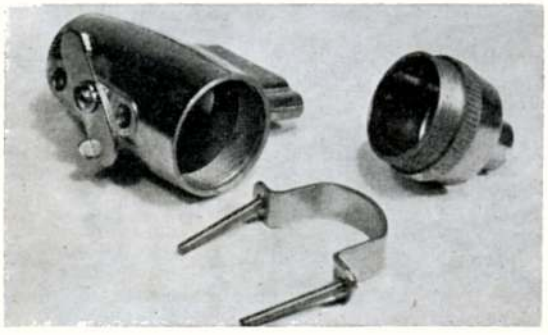


If the extension piece is examined, it will be found that the holes through it are counterbored (*Fig.* 4). This is useful as the next stage is to make two brass extension nuts (*Fig.* 5). These were actually made from a broken Merco spray bar and they can be used to bolt on the exhaust stack and throttle. Then the silencer is bolted on without disturbing the throttle in any way. This permits easy removal of the silencer if you wish to make as much noise as the others at a contest!

All that remains now is to modify the control horn on the exhaust throttle as in *Fig.* 6. Assemble and fit the exhaust stack extension to the engine, connect up the linkage and fit the silencer (*Fig* 7).

The job is well worth the effort and modellers who have seen it and heard the silencer are most impressed. One becomes very cock-a-hoop when a spectator watching the model flying from a point a few hundred yards away asked how such a large model could fly "through the book" with only a .19 up front!! However, the author was deflated soon afterwards when another chap declared firmly "But I LIKE to hear the engine howling with power!"

Herein probably lies the biggest of the silencing problems. Aeromodellers really enjoy the sound of their engines roaring away but don't always consider the fact that most non-modellers positively DO NOT!



Bottom left, Geoff Higgs' Merco 35, and at right, Frank Warburton's Merco 35, each with OS silencers fitted with gasket adapting straps around cylinder. Performance is unaffected, these silenced models placed 3rd and 1st. at S. Midland Area Rally, Cranfield—why NOT use them??

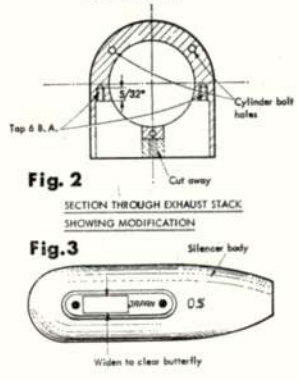


Fig. 2

SECTION THROUGH EXHAUST STACK SHOWING MODIFICATION

Fig.3

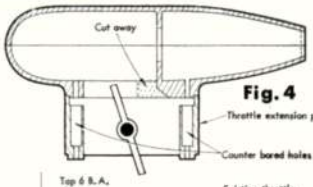


Fig. 4

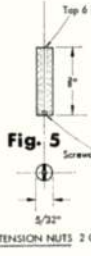


Fig. 5

EXTENSION NUTS 2 OFF

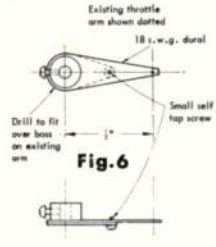


Fig.6

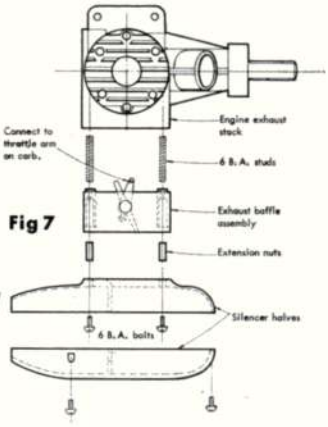
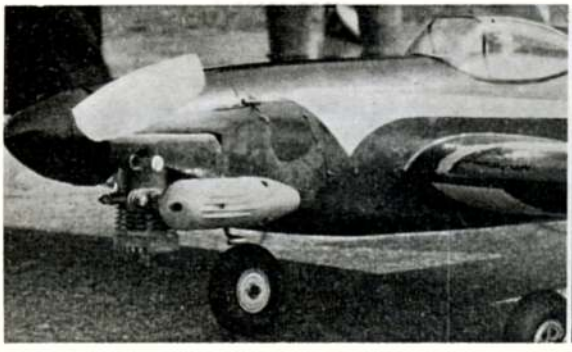
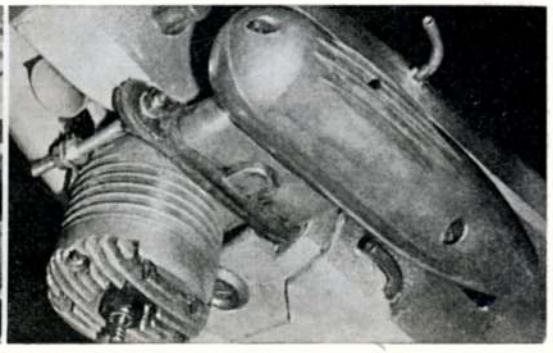


Fig 7





Polyurethane finishes

Joy "G'aze" is thin and clear, applies easily over all test surfaces except enamel and makes a good general proofer. Cost is 4s. 6d. per ½ pint. Two coats give high gloss.

Ronseal wood finish (4s. half-pint) and Furniglass PU-15 (11s. 6d. pint) make good clear proofers with high gloss. Grain filler (1s. 6d.) is specially for polyurethane finishes.

HAVE YOU EVER wanted to obtain those glass like finishes seen on the experts' speed and team race models? Polyurethane is the new "answer" offering good covering power and an easy to obtain glass like surface. It is proof against standard diesel and glow fuels, as shown in our test chart. Only two chemica's found to attack it are carbon tetrachloride (Thawpit) and nitro benzine, if left in a hot room or in the sun.

Two types of polyurethane paint are available. These are the two part catalysed type, and the single part moisture hardening variety.

Some manufacturers state that one must use polyurethane on bare wood surfaces only. In the light of "experiment" we chose to ignore this. A typical team racer finish would be three coats of sanding sealer and three of polyurethane (clear or coloured). rubbing down between each coat.

"International" brand polyurethane paint (the coloured type as used for our tests) is the two part type and must not be applied in damp conditions or below 40 deg.-45 deg. F. It is most important to keep the hardener container sealed as it will react to moisture and become hard and useless. Joy "Glaze" (clear) is one part only and sets by moisture reaction, so the tin is well sealed with three steel clips and must be kept that way between applications. B.M.P. "Sonic" has similar characteristics, sells in 3s. cans

Polyurethane paint dries in about 2/3 hours and goes tacky very quickly. Do not try to re-touch any freshly painted parts. Retarding thinners can be obtained.

The finishing is rather harder on the elbow than for cellulose dope but the results are worth the extra effort. Start by rubbing down between each coat with wet and dry paper used wet and lubricated with a soapy solution.

Start with 320 grade, it wears down nicely for each coat. Alternatively a fine rubbing down compound such as I.C.I No. 7 could be used. One must not leave more than 8-9 days between each coat or they will cure as separate layers. This gives the result of a fine white line all around the edge of the patch last rubbed away. Final polishing is best done after the paint has been allowed to dry for 7-10 days at about 60 deg. F.

Special polyurethane thinners have to be used ; but brushes can be washed out in ordinary dope thinners as desired. A handy tip for the painting stage is to make a tent out of newspapers using a balsa wood frame. This keeps off those offensive dust particles. Almost instant fuel proof touch ups can be made on the field by using 10 per cent colour and 90 per cent hardener—this is not the proper mix but it dries hard and is fuel proof in about 10 minutes. Specific mixing proportions for polyurethane paints are given on the containers

When using polyurethane over tissue, nylon, or silk we advise a couple of coats of clear dope to tighten up, as the polyurethane has no shrinking properties.

International Paints Ltd. polyurethane is available in clear, black, white and about ten other colours from leading model shops, large boat dealers and hardware merchants. Henry Nicholls Ltd. were among the first model shops to stock it, the pint packs of colour retailing at 18s. 3d. and clear 15s. 9d. Thinners are 6s. per pint.

Gremlin Hi-Speed epoxy resin paint (¼ pt. 5s. 6d.) whilst not of polyurethane base is worth mention as it has very similar properties. It flows on very nicely and has a high gloss. The degree of resistance to model fuels can be seen in the test table which relates to panels of cellulose, Humbrol "hot-fuel" proof dope and enamel. "Sonic" and "Glaze" are not advised over enamel, as they craze the surface.

Time delay Fuel Proofing Test

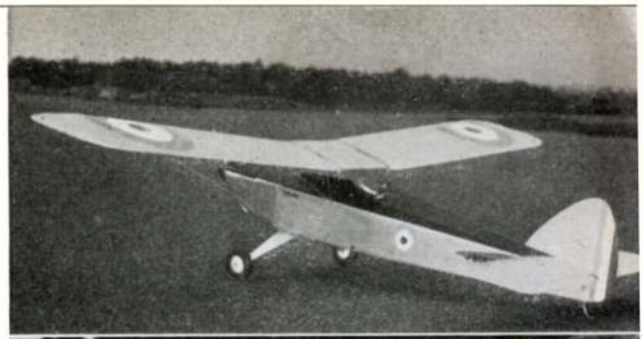
CURING TIME	3 DAYS AFTER APPLICATION				7 DAYS AFTER APPLICATION				
TEST FUEL	OLIVER FORMULA DIESEL	GLOW PLUG FUELS 5% NITRO	50%	100%	OLIVER FORMULA DIESEL	GLOW PLUG FUELS 5% NITRO	15%	50%	100%
International Polyurethane Marine Finish	Proofed	Proofed	Proofed	Proofed	Proofed	Proofed	Proofed	Proofed	Proofed
Gremlin Hi-Speed Epoxy Resin Paint	Proofed	Proofed	Spoiled	Spoiled	Proofed	Proofed	Proofed	Spoiled	Spoiled
Gremlin Sonic Fuel Proofer	Proofed	Proofed	Spoiled	Spoiled	Proofed	Proofed	Proofed	Spoiled	Spoiled
Joy Polyurethane Glaze Finish	Proofed	Proofed	Spoiled	Spoiled	Proofed	Proofed	Spoiled	Spoiled	Spoiled
Ronseal Hardglaze Polyurethane Floor and Wood Finish	Proofed	Proofed	Spoiled	Spoiled	Proofed	Proofed	Proofed	Spoiled	Spoiled
Furniglass PU-15 Polyurethane Clear Varnish	Proofed	Proofed	Spoiled	Spoiled	Proofed	Proofed	Proofed	Spoiled	Spoiled

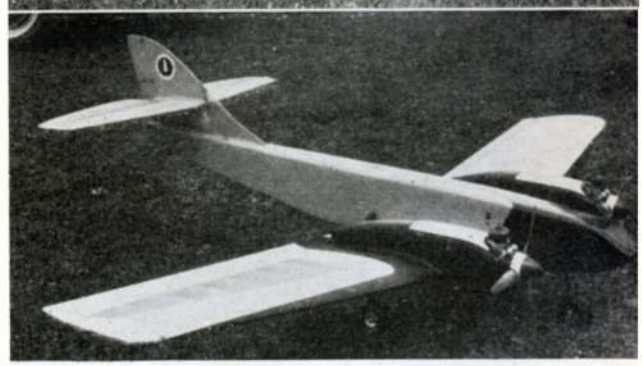
Round the RALLIES

WIND MARRED an otherwise excellent day at Abbotsinch for the **Scottish Nationals** on September 15th, resulting in the postponement of the Scale event and enabling combat models to perform consecutive eights long after the engine had cut. One man obviously unaffected by the wind was Dick Place of Wharfedale who established no fewer than three new British records—for F.A.I. T/R final and heat (9:6.9 and 4:16.5 resp.) and for ½A final (8:28.5). The final rounds of combat were clearly and closely contested, making up a little for the acrimony and accident earlier in the contests, Lee of Wharfedale winning. F/F Results: Power 1. Petrie (Montrose) 7:50, Rubber 1. Montgomery (Kirkcaldy) 6:48, Glider 1. Black (Glasgow S.A.) 7:21.

South Bristol M.A.C.'s Vintage Event for pre 1949 designs at Blakehill Farm on September 22 suffered from a modern complaint—lack of entries, 13 in all for free flight and none for C/L! In a pleasant atmosphere, lacking the usual over-seriousness, J. Mayes of S. Bristol won Rubber with a 1946 'Mick Farthing Lightweight.' Close behind came C. Strachan of Bristol and West with a 'Raff V' that demonstrated its unusual D/T on the last flight, the rear end detaching and spinning on a thread. J. Leitch of S. Bristol, back in the game after a 10 year lay-off, found he had not lost his touch by putting in good flights with a Fox 15X 'Banshee' to top the Power event. Glider proved to be a flyover for F. Crowfoot of Bristol Bulldogs with a nicely finished 'Fugitive.' His opponent M. White of S. Bristol lost his 'Ivory Gull' in a thermal whilst trimming! Up the A.P.S. designs!

At the **3rd Crawley Rally**, Great Buckswood Farm on September 29th, flight times were altered to four flights of 2 min. maximum, but generally the times were very low. Tony Young of St. Albans won Glider flying his A/2, with all sheet top surfaces, with 2 thread turbulators, 1/16 in. and 3/16 in. from the leading edge. The B.U.A. 'Safari' Trophy for rubber was won by J. Allen of Brighton with 7:21, an interesting trend being the small dia. free wheeling prop models. The Brooks Challenge Cup for ½A power was won for the second year by a diesel powered





Top : Tom Chambers winds for Dick Godden (Cambridge) now trying his hand at indoor flying at the Cardington meetings. Right column, top to bottom, semi-scale "Wifurskin" by F/Lt. J. Bowmer (R.A.F. Benson) using OS 19 & 4 channel Orbit Rx circuit at R.A.F. Champs. Kneeling in independence is S/Tech. Shaldon (R.A.F. Basingbourne) winding his A.P.S. XL-56 mounted in metal cradle. Central is Harry Brooks' 6 ft. K & B 35 model with high mounted tail, reminiscent of Paul Rogers' last machine. Charming ladies are Joan Skilbeck with T. Lee's combat wing and Miss J. M. Lofthouse with the Long/Davy mode, both keen supporters of Wharfedale club—flyers too at area champs and Wanstead rally! Below, left to right, home from R.A.F. Geilenkirchen, Germany, M. Taylor (Northwood) with Eta 29 rat racer at Wanstead. Centre is typical area champs scene in the wind. A. Abbs (East Anglia) winding his "Whiskas—3" Wakefield in first round, placed 11 h. R h, at Bristol vintage event, power winner John Leitch starts Fox 15X in a "Banshee" whilst son, with chuck glider, looks on at model older than himself.

Round the Rallies *continued*

model, Gordon Cornell's (Croydon) modified 'Dynamo' with his own Dynamic .8 c.c. engine, making 5:56.

Wanstead Warhawks Rally at Wanstead Flats, on September 29th was a great success. Attended by 130 entries in Rat-Racing, "A" Combat and "B" Combat. Standard of flying was very good with the exception of Rat-Racing which was downright poor. Only half the R/R entries turned up to fly and the average speed was about 85 m.p.h. Winner was P. Tribe of Northwood flying his ETA 29 powered boxy type model. Junior winner P. Davis of Anglia used a Merco .35 and was the most reliable flyer present. Class "A" Combat was another victory for that "up and coming chap" Pete Tribe who defeated fellow clubman P. Perry. One of the best bouts was between Pete Freebrey and Neil Tidey of Worthing. Tidy was very fast with his ETA 15 Mk. II engine and flew through several nasty situations, eventually writing his model off while Pete Freebrey lost nearly all his covering. The Junior winner was M. Burrows of Wanstead Warhawks (no fiddle), who just led W. Leader of Winchester for that Trophy. Class "B" combat showed great improvement. First man was D. Sizmore of Sidcup A.S. flying a stabilator model powered by Johnson 35 C.S. Junior winner R. Sibbald was also from the Sidcup club.

At R.A.F. Debden over 28/29th September, the **R.A.F.M.A.A. Championships** survived particularly tough conditions. Notable upsurge in R/C standards and grim determination in free flight were highlights. Bomber Command proved to be leaders, with Cranwell taking the Graham White Trophy for best Station, and S/T "Andy" Anderton the Victor Ludorum. Concours d'Elegance brought forth a bevy of well-finished models, the scale types being specially impressive, ranging from Camel to Catalina. T'was a great pity the lads were not blessed with less wind, they put on a grand show of models for their Annual Jamboree. Next event in the R.A.F.M.A.A. calendar is the A.G.M. at Air Ministry, Adastral House, London, on December 9th, at 14:30, when all Stations can be represented.

On the same September 29th, at R.A.F. Barkston Heath, the **S.M.A.E. Area Championships** proved to be a disappointing meeting from two points of view—firstly there was very little support and secondly the weather conditions made it quite impossible to judge which was the Champon Area. Only five Areas entered Teams in the free flight section and because of the atrocious weather conditions the Western Area team decided not to fly. Of the others only the Northern and North Western Areas entered full teams of 12 individuals and they placed 1st and 2nd. Barry Halford's leading score in rubber of 7:24 was really very good indeed ; and the power flying of the NW team was of the highest standard. The Northern Area team of Davy/Long won team race with 4:55, 5:10 and 4:46, only other team to beat 5 mins was 2nd placing Hampson/Yates for the NW with a 4:55. Coincident with the Champs, was the "AEROMODELLER" Trophy for Multi R/C. Stuart Foster did well with his "Nimbus 2" (Super Tigre 56) in the rough weather and so collected his first National Trophy, though no doubt like us, he would have preferred more competition 9 entries hardly make it an event of top status.

October 6th was the date for **Glasgow Barnstormers-Hornets Rally** F/F entries disappointed the organisers, who were offering exceptional prizes. They did, however, draw some world class fliers, New Zealanders McGarvey and Hopley taking first and second in the rubber fly-off, Nev Hopley also ousted Al Wisher in the Glider fly-off. Lee of Novocastria gained first two places in power, by means of re-entry with 8:39 and 8:21—busy man! Although there was no contest, several radio models were to be seen performing. Yet, when there is a contest, there are few entries . . . strange!

Next Sunday, **Hornchurch M.A.C.** held their Rally, at Chobham Common (October 13th). Turbulent conditions over the wind-swept common kept times down, only George French's huge power model subdued the elements to return a perfect score. Winners were—Rubber 1., R. Bailey (Oxford) 8:12; Glider, A. Wisher (Croyden) 8:45; Power, G. French (Laindon) 9:00; ½A Power, Mussell (Farnham) 8:54; Chuck glider, A. Young (St. Albans).

South Coast Radio Control Gala was held at Golden Cross, near Eastbourne on October 13th, where a stiff breeze, had most of the Single/Intermediate class in trouble. This was a Spot & Nominated time comp., also requiring entrants to fly upwind round a pylon. Only about 3 succeeded in the upwind leg, V. Welham of Worthing proving best. Multi class delighted a good crowd, and was decided on the best of two flights, Ed. Johnson winning. Scale only attracted three entries, but created a lot of interest. The result was very close J. Morton's 'Mustang' just beating D. Bryant's 'Macchi.'

Meanwhile, **Indoor** enthusiasts have been steadily plugging away though depleted in number, at R.A.F. Cardington. Bert Spurr broke the half hour with a fine 31:21 on October 13th, followed by Ron Draper 27:38 and Stan Wade who made 27:12 on the previous day. This last weekend of the year at Cardington also marked a farewell to popular Sgt. Cliff Savage, who has done so much for the indoor flyers with his kind hospitality. The occasion was celebrated with presentation tankard, which Cliff tells us he sincerely appreciated.

BATTLE FOR THE largest number of reports in Clubman's Postbag seems nowadays to be between the London and South Eastern Areas. They drew 7-7 this month so let's start with the big metropolis and in "London Modeller" the **LONDON** Area Newssheet is send best wishes to Pete Freebrey of **Northwood M.A.C.** He has taken on the duties of S.M.A.E. General Secretary as well as Chairmanship of the London Area at meetings which take place at 8 p.m. every second Monday of the month at the "John Snow," Broadwick Street, London, W.1. First plan in "L.M." is K. Smith's simple but successful A/1 glider with two firsts to its credit this year. Alan Dorrell contributes a chatty stunt C/L flying article and we learn that the 12 man F/F team decided 'en masse' "not to bother to go" to the Area Championships—the night before the event! After making the journey on his own, Pete Freebrey of Northwood M.A.C. (that man again!) came 1st in Combat at the Northern Area meeting. Getting away from Combat a visit to Ivinghoe Beacon for the **Luton** Club meeting resulted in success when Pete Tribe came 1st in the main slope soaring event and Pete Freebrey came 1st in Chuck Glider. Then at the Wanstead Warhawks C/L Rally combat gave them their biggest achievement with 1st, 2nd, 3rd, equal 4th and equal 5th, plus 1st and 2nd in Rat Racing. No wonder they say "Hearty Congratulations to the Wanstead Warhawks for a Rally that ran smoothly and efficiently throughout the day." **St. Albans M.A.C.'s** last few comps. have been graced with perfect weather, Tony Young establishing World Record progressive fly-off time in F.A.I. glider—only to find his F.A.I. licence had expired! John "Lulu" Baker won the London Area fly-off in Team Rubber having rebuilt the fuselage on the field, just to show what an old maestro can do with a 17 year old design when he gets the time. Mike Burrows still remains well to the fore in glider placing 3rd at the South Midland Gala and 1st at the South Coast event. As usual at the end of the season enthusiasm increases, eleven gliders being dragged out for the team event. A sad loss for the club was the sudden death of John (Carl) Simeons (as reported in Hangar Doors last month). They feel sure that all who knew Carl will join them in offering his mother and relatives sympathies in their bereavement. **Wanstead Warhawks M.A.C.** report their 1963 C/L Rally a great success. Weather was, for once, kind but the day was slightly marred by certain competitors doing such stupid things as tearing up hardboard signs and breaking wooden fencing poles. The offenders are known and their entries will be refused at any further Wanstead Rallies. It was also surprising that thirteen stop watches could be "borrowed" from competitors. Wanstead would like to say thanks—and come again in '64 to all competitors. Eight of their members ventured to R.A.F. Debden for the S.M.A.E. C/L meeting on October 13th. **Finchley Fliers M.A.C.** have had poor luck this month. A pit man was late at the Wanstead Warhawks rally so they were disqualified. They also lost a Rivers 2.5 powered radio job O.O.S. A change of luck is apparent as they now have a new craft room and members are producing a new design combat model that is expected to be really "hot." The club intends to hold a C/L rally in '64 but the date still has to be fixed with the local council. Enthusiastic members are welcome at Summerside School, School Way on Tuesdays at 7 p.m. The **North London Society of Model Engineers** are mainly boat fans but do have an aircraft section and Roy Yates took 3rd place in Mono and 4th in intermediate at Cranfield with his 'Rowdy' design. Fund raising took the form of a jumble sale at which they raised £40 for their track fund.

In spite of the "summer" **North Kent Nomads** had a very good season's flying in all classes, with an increase in free flight. On the 22nd October they flew against **Northern Heights** at Chobham in the second round of the L.D.I C.C.C. and had an exciting win. They next meet Croydon in the final. The team of Bill Hubbard (rubber) and Alan Service (Power) both had three max's. John Giffen (glider) managing 5:32. Bill Hubbard also came 2nd in rubber at the South Coast Gala on the same day. Also on the same day they held the club Radio Control Comp. Winners were, Single channel, 1st George Hattemore; Multi, 1st Geoff Chapman; Galloping Ghost, 1st George Hattemore ; Wickens Shield (U/R Rubber) 1st John Giffen ; Parker Power, 1st Brian Hammond.

Crawley D.M.F.C. flew their leg of the 2nd Anglo-U.S.A. Coupe d'Hiver postal event on 29th August. Team total was 12 minutes 23 secs. Photo shows time turn-out

Club Champion for 1963 is George Hattemore. Their October meeting was highlighted by a colour film of the 1963 World Radio Control Championships held at Genk, presented by club members Geoff Chapman and Ivor Bittle.

"Sea Dog" the **SOUTH EASTERN** Area newsletter tells of an area run R.T.P. event for autumn evenings. From **Chichester M.A.C.'s** newsletter "Clear Dope" we learn they are helping to run a local football pool which will swell the club funds quite a lot in the near future. Their newsheet editor travelled to Wilmington on 31st August to the S.E. Area Slope Soaring meeting where he flew his A/2 'Ropiano' to 1st place and best time of the day with 4:57. **Crawley and D.M.A.C.** report that despite bad weather many modellers attended their rally on September 29th. They are very tidy too, very little litter being fiund at the end of the day. The C/L section was run on October 20th, "Stoo" Holland (Northwood) winning the B.E.A. "Trident" trophy again for Combat and having a terrific semi-final in the process with Neil Tidey (Worthing). **Hatfield's** R. Bowyer-Lowe was the only undrowned "Rat" to race. The last round of the R.A.F.A. shield at Ashdown on October 6th was flown in ideal weather. The club consolidated its lead and won by 7½ points. **Worthing Bald Eagles M.A.C.'s** combat specialist, Neil Tidey proved his worth by flying in both A & B combat at the Wanstead Warhawks C/L Rally on September 29th. In "A" combat, flying his ETA 15 Mk 2 powered 'Twister,' he reached the semi-finals before being beaten by one of the seemingly innumerable Northwood Combateers. Preparations for the S.E. Area Winter Indoor Rubber R.T.P. meetings are well in hand. Two classes are being flown, speed and duration. Trophies for both classes and a best all rounder trophy are at stake. The past month was a very busy and successful one for **Brighton D.M.A.C.** members. On the 15th September at Ashdown in the Farrow Shield for team rubber they totalled 34:52 for 2nd place and strengthened their Piugge Cup lead. Top scorer was Fred Boxall with a full house and 6:13 in the fly-off. John West only managed 1.20 in the Frog Senior fly-off due to a bad engine run. He scored 11:50 in A/2, taking 35 mins for five flights. At the South Coast Gala, Dave Welch and John West reached the 15 man fly-off in power and placed 6th and 9th respectively. Fred Boxall placed 7th in rubber with a fly-off time of 4:56. Max Trip and Grahame Gates came 1st and 2nd in Tail-less Glider. A week later at Crawley, Dave Welch and John West were 1st and 3rd in Power with Jack Allen winning Rubber. October 6th at Ashdown for the final event for the Piugge Cup the club fielded two teams placing 10th and 14th, while in the Flight Cup Fred Boxall did a full house plus a fly-off of 4:20 for 7th and in F.A.I. power both John West and Dave Welch did full houses followed by 11:24 and 6:37 respectively for 1st and 2nd. On October 4th **Cosmo A.C.** held a film show with film from the Shell Mex & B.P. film library showing the story of "Powered Flight." They also had one showing how aircraft helped people living in remote corners of the world in their everyday life. They were very pleased to welcome members of **Sidcup** and **Gravesend** model clubs. In a club rat-race the ½A event was won by new member C. Coombridge and class A by H. Jones. An inter club contest is to be arranged between Sidcup, Cosmo, and Gravesend model clubs with combat stunt and rat-race events. They also hope to organise a North West Kent Model Flying Gala next year.

Leatherhead & D.M.F.C.'s stand at the Model Railway Engineering Exhibition had large crowds around it. The main attraction seemed to be the electric R.T.P. using specially motorised Keilkraft models. Due to concentration on this exhibition hardly any flying has been done this summer as all models had to be carefully preserved for the show. Look for the R.T.P. flier next month—full-size plans for the Fokker **'Eindekker'** fighter.

From the **SOUTHERN** Area **Lee Bees M.A.C.** report they are active once more with membership standing at 20. Interests are varied from Ray Brown's multi radio to M. Mayne's C/L stunt. Meetings are on Friday evenings at 8 p.m. at Bury House Community Centre, Gosport. They fly at H.M.S. "Ariel," R.N.A.S. Lee-on-Solent.

Cambridge M.A.C. from **EAST ANGLIA** have a local variant of Rat-Racing. Instead of a single event they held a series of six, at two week intervals. Rules were kept to a minimum. 50 ft. lines for 2.5 c.c. and over, 40 ft. lines for anything smaller. Heats last 15 min., biggest lanpage qualifies. Finals are 500 laps with a Le Mans finish to decide places. Points are given in each race, 4 for 1st, 2 for 2nd and 1 for 3rd, to be added up at the end of the series. There are no other restrictions and the system definitely works as results show:— two equal first, one using 2.5 c.c. and the other 1.5 c.c. and four others close behind after 3,000 laps of racing. Radio flyers Peter Donaldson and Noel Leavis have successfully flown their models simultaneously to find that the 8 channel superhets they designed and made were as trouble free and reliable as commercial units costing eight times as much. If you are tired of complaining neighbours why not move to **Colchester M.A.C.** where they have not had a noise complaint for three years and there are half a dozen flying fields to choose from, 'plus' a few deserted airfields. On Sunday mornings they fly C/L on the side of East Hill beside Paxman's Car Park. Speed and team race men meet at Boxted Airfield just north of the town. Top times in T/R have been 4:10 in ½A by Chaplin/Radcliffe with a P.A.W. 1.49 (works mod) and 4:26 in F.A.I. by Manser/Wilson with a Copeman Oliver Tiger.

The **SOUTH MIDLAND** Area **Bedford Eagles** Club are becoming more interested in competition flying and some very good times have been recorded, not the least of which was a 7½ minute flight from 'Coupe d'Hiver' model. Negotiations are in progress for three flying fields to replace their present unsuitable one.

The **MIDLAND** Area C/L Championships were run in Combat only due to lack of entries in Stunt and Team Race. Thirty-one entries fought it out, the results as follows. 1st M. Lewis (Leics). 2nd G. Hawes (Leics). 3rd M. Merman (Leics). Club positions are 1st **Leicester** 36 pts. 2nd **Outlaws** 20 pts. 3rd **Bilston** 10 pts. 4th **West Brom.** 3 pts. **Sutton Coldfield R/C A.C.** regretted having to cancel their annual R/C rally this summer, so it was decided to hold an open day on their flying field on 15th September. Weather was all that could be desired and several hundred visitors enjoyed watching the flying. The George Hales Trophy for single channel was won by Terry Cooper, second R. Ginder and third L. Jackson. The Maiden Stakes Trophy for Multi R/C donated by club member Dennis Sheasby was won by Alan Thomas who gave an excellent performance. Very close second was Keith Jones and an even closer third was R. J. Sharpe. They also flew six superhet R/C models simultaneously, the spectators voting this the best event of the day. Prizes were awarded by Mr. and Mrs. T. Perry of the local model shop who also provided a grand contribution to the prizes. **Hadsworth M.A.C.** recently held an inter-club combat comp. with nearby **Blackheath M.A.C.** At the Wanstead Warhawks Rally only one member got past the first round. They had a good day watching the rat-race, while fibre-glassing other club's models. Club membership now stands at about 18 with interests still centred on combat, meetings are at Grestone Avenue School, Handsworth. They were disappointed to read in the local paper that their plea for a flying field-cum boating-pool in the Birmingham area never passed the suggestion stage. **Leicester M.A.C.** are arranging a series of R/C lectures for the winter season. Their talk with the City Council for a control line circle in one of the council parks did not come to anything so they are going to have another try in the manner of other clubs of recent years. **Clayton M.A.C.** of Stoke-on-Trent now point out that they have not entirely deserted the S.M.A.E.—'hooray!' Competition minded members remain affiliated. Club Champion is P. Taylor, with D. Hambley and E. H. Snow joint seconds.

From the **WESTERN** Area comes long reports on the area meetings and champs.—much more than I have room for here. At Blakehill farm on September 15th, weather conditions were perfect. Two flights by Elton Drew in glider in excess of 15 mins. landed **within 200 yards** of launching point and one O.O.S. by Brian Bow was 30:29! Bill McGarvey **(Stevenage & N.Z.)** in F.A.I. glider had 5 maxes with fly-offs of 3:40, 4:00 and 2:40. Second place went to Elton Drew of Bristol and West with four maxes in a row and a final flight of 1:17. Third was Bailey from **Neath** in South Wales with 11:13. Only one Western Area club, Bristol and West entered the Farrow. At one stage it looked as if a "full house" would be scored by the team. Included in the Weston Area newsletter is a well-prepared plan for John Clampitt's open rubber model showing feathering prop details. On October 6th the weather was rather dismal but in the "Flight" Cup five area members returned perfect scores, Bristol and West took the first four places with John Cartwright 3:39, Jim Berryman 3:35, and Dick Cummins 3:12. The first two models had feathering props the third using a folder. Four members of the **Plymouth** club made the journey to Blakehill. S. J. Noseworthy making 3 maxes but leaving before the fly-off. In the "Model Engineer" Cup Bristol and West, and Neath from South Wales were the only clubs to field complete teams, respective team totals were 32:12 and 15:43. The Bristol and West included 8 maxes three to Elton Drew, two each to Dick Cummins and John Cartwright and one to Brian Bow. The Bristol club score owed a lot to teamwork and patient timekeepers. Thermals were scarce and the entire team stationed themselves in the downwind position and towed up under any models that appeared to be in lift.

After that Bristol and West epic let's move on to the **Northern** Area where we report the passing of Huddersfield M.F.C. this is not an occasion for sadness; but rather for jubilation at the conclusion of long negotiations between H.M.F.C., **Huddersfield Aeromodellers Association** and the Huddersfield Corporation. Two small clubs are now joined under one name, with one aim and a site of nine and a half acres to develop as a flying field. This seemed a long way off six months ago but a persistent group of six negotiators has whittled the problems down. The **York M.A.S.** boast the largest membership in the Northern Area and at their A.G.M. they even had voting for committee members. There has been much more interest in competition flying this year with success particularly in team events, culminating in the York "A" team of D. Wiseman (Rubber), J. Taylor (Power) and D. White (Glider) putting up a perfect score of 27 minutes against **Rotherham** and **Sheffield** to win the final of the Northern Area Knock Out Trophy. The same three members were in the Northern Area team that won the Area Champs. at R.A.F. Barkston Heath. York team also beat Vancouver in the "Migrator Shield" International Postal Challenge Match and the rubber team were second in the Farrow Shield with 34:55. On the individual side D. Wiseman has had a good season and he some-

CLUB NEWS (continued)

how managed to perform in 'three' fly-offs at the South Midland Area Gala and took 1st in Glider and 3rd in ½A and A. Power. The club always welcomes new members and has meetings alternate Fridays at the British Legion Headquarters in York, and are very fortunate in having Elvington Aerodrome as a regular flying site, but its future use is now in doubt. Apart from the free-flight side they also have a large radio section.

The **SOUTH OF SCOTLAND** have been busy with the Scottish Nationals and other rallies (See Rally Reports). Sunday, September 22nd saw a **Kirkcaldy** Rat-Race and Combat. Entries were smaller than last year's. Winning Rat-Racer by Bell of **Dundee** had a large glow motor and a 6 oz. tank. Second was I. Carson of **Glasgow Hornets** who won the combat final which brought together two Rivers 3.5 powered 'Peacemakers.'

From **WALES** comes news of a new club, **Welshpool M.A.C.** with 10 members. They mainly fly C/L Stunt, Glider and S.C. R/C and small sport F/F jobs. They have rooms in the youth centre building and indoor flying takes place Monday's and Wednesday's at 7 p.m. They also have a C/L site and free flight field. At the moment they are having a membership campaign.

IRELAND report the revival of **Ulser M.A.C.,** this is now for R/C only, a "do" held at Toome airfield on September 29th bought an entry of 33. Gale force winds were blowing but this did not deter 12 S/C men from flying. The winner was B. Troy of Cole Vaine flying a 'Super 60.' Intermediate was cancelled due to the weather. Multi was won by L. Blair of Larne flying a 'Sultan.' The monitor was fed through the P.A. system and seemed very popular. Plans are already under way for the Ulster Champs. to be around July '64. It will extend over two days. Any cross-channel entries will be very welcome. Contact W. H. Menary, c/o ATO Model Crafts, 36 Wellington Place, Belfast 1.

The CLUBMAN.

S.M.A.E. Results

September 15th (**What** a day!!)

Farrow Shield (*Team Rubber*) 24 *Flew*

1.	Bristol and West	34:59
2.	York	34:55
3.	Brighton	34:52
4.	Lincoln A.	34:33
5.	St. Albans	34:21
6.	Norwich	34:07

Frog Senior Cup (*Open Power*) 53 *Flew*

1.	G. French	(Essex)	9:00 + 4:33
2.	V. Jays	(Surbiton	9:00 + 4:20
3.	M. Bayram	(Lincoln)	9:00 + 3:56
4.	G. Lowe	(Wallasey)	9:00 + 3:46
5.	P. Manville	(Bournemouth)	9:00 + 3:25
	G. Stringwell	(Rotherham)	9:00 + 3:25
7.	S. Savini	(Wallasey)	9:00 + 3:20
8.	M. Gaster	(Surbiton)	9:00 + 3:15
9.	J. Boxall	(Portsmouth)	9:00 + 2:59
10.	G. Cornell	(Croydon)	9:00 + 2:57
11.	D. Welch	(Brighton)	9:00 + 1:24

S.M.A.E. Cup (*F.A.I. Glider*) 72 *Flew*

1.	A. G. Young	(St. Albans)	15:00 + 44:10
2.	M. J. Woodhouse	(Norwich)	15:00 + 16:36
3.	A. Wisher	(Croydon)	15:00 + 16:11
4.	C. Jackson	(Surbiton)	15:00 + 15:31
5.	W. H. McGarvey	(Stevenage)	15:00 + 10:10
6.	J. Blount	(Croydon)	15:00 + 4:47
7.	M. Burrows	(St. Albans)	15:00 + 1:25
8.	D. Latter	(C.M.)	15:00 + 0:14

Team Glider 35 *Flew*

1.	Bristol and West	32:12
2.	Northern Heights	30:49
3.	Hayes	30:17
4.	St. Albans (A)	28:16
5.	Northampton	26:50
6.	Timperton	25:52
	Norwich (A)	25:52

Flight Cup Finalists (*Open Rubber*) 42 *Flew*

1. W. McGarvey (Stevenage) + 7:02; 2. D. R. Woods (St. Albans) + 5:49; 3. T. Faulkner (Luton) + 5:35; 4. H. Tubbs (Baildon) + 5:05; 5. R. Godden (Cambridge) + 5:02; 6. D. Wiseman (York) + 4:21; 7. F. Boxall (Brighton) + 4:20; 8. C. Jackson (Surbiton) + 4:17; 9. N. Elliott (Croydon) + 3:51; 10. T. Payne (Luton) + 3:50; 11. J. Cartwright (Bristol and West) + 3:39; 12. J. Berryman (Bristol and West) + 3:35; 13. A. R. Wells (Hornchurch) + 3:20; 14. R. Cummins (Bristol and West) + 3:12; 15. G. Cameron (Baildon) + 3:11; 16. J. Clampitt (Bristol and West) + 3:06; 17. R. C. Pollard (Tynemouth) + 2:08; 18. J. North (Croydon) + 0:06.

F.A.I Power 17 *Flew*

1. J. West (Brighton) 15:00 + 11:24; 2. P. Welch (Brighton) 15:00 + 6:37; 3. P. Manville (Bournemouth) 15:00 + 3:25; 4. D. Cook (Canterbury) 14:31; 5. V. Jays (Surbiton) 14:27; 6. G. French (Essex) 14:26.

Plugge Placings

1. Brighton, 1240.723 points; 2. Whitefield, 1077.695 points; 3. St. Albans, 1066.227 points; 4. Bristol and West, 955.619 points; 5. Norwich, 774.706 points; 6. York, 685.870 points.

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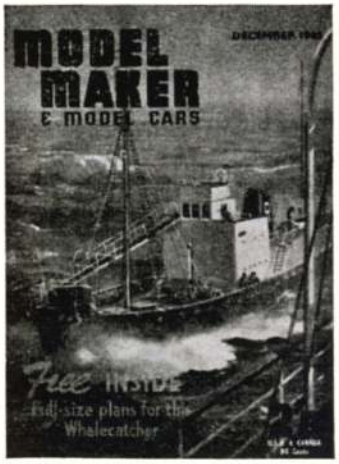

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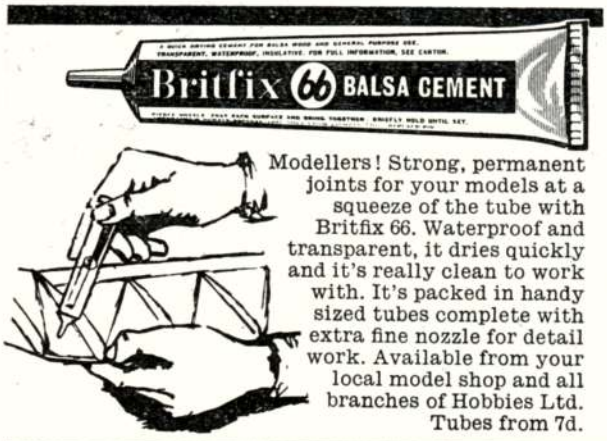

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"Model Avia", the model magazine that covers the world of model flying. Edited in French. Send for free specimen and subscription details: Model-Avia, 31 rue du Printemps, Bruxelles 5, Belgium.

230 "Aeromodellers" 1935 (first issue) to 1959. Stamped addressed envelope for list. Box No. 713.

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I certify that the statements made by me above are correct and complete. For and on behalf of Model Aeronautical Press Ltd. (signature of editor, publisher, business manager, or owner), K. M. EVANS, director.

CERTIFICATE OF ACKNOWLEDGMENT OF EXECUTION OF AN INSTRUMENT

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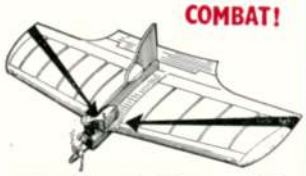

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54/6

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79/6

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54/6
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