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JAGUAR

Kit includes: Super-detailed plan approved by E. W. Evans (designer), specially graded strip and sheet Balsa Wood, Hand Carved 18″ diam. Balsa Airscrew, Thrust Race, etc., etc.

Wingspan 44″. Overall Length 37″. Wing Area 205 sq. ins.

PRICE 21/- (Excluding rubber motor.)

PERFORMANCE COUNTS!!

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"M.E." Cup 1st place.	"Weston" Cup 1st place.
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Midland Rally 1st and 2nd place.	Eaton Bray 1st place.
"Gutteridge" Trophy 2nd place.	"Gutteridge" Trophy 1st and 2nd place.

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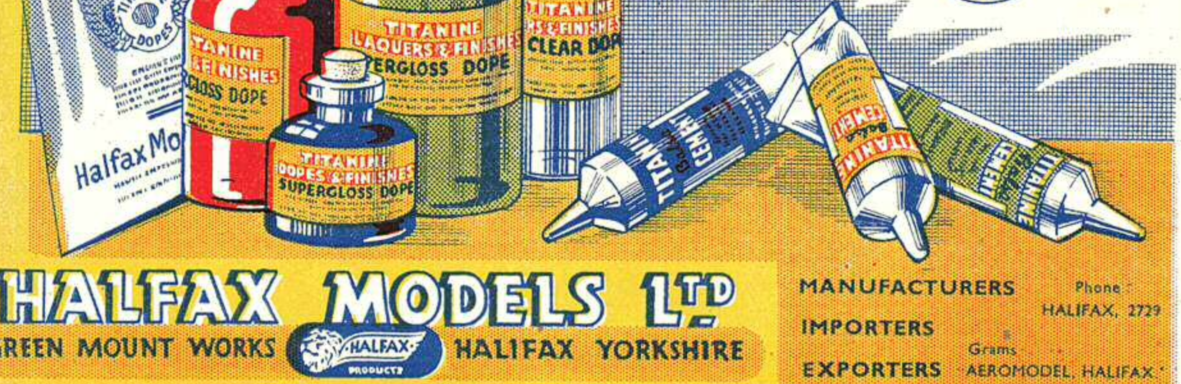

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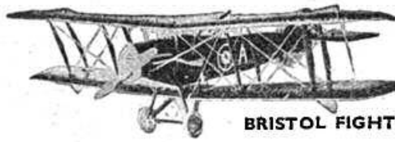
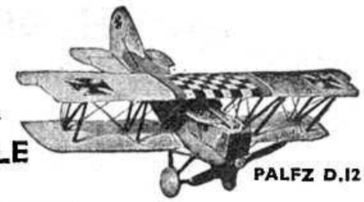

BRISTOL FIGHTER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1/4 inch—1 ft. SOLID SCALE

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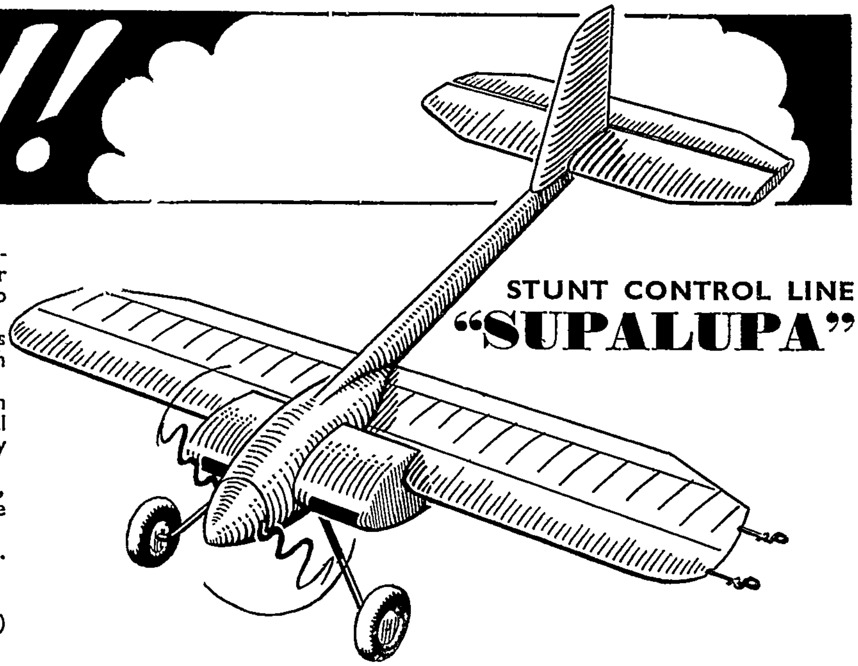


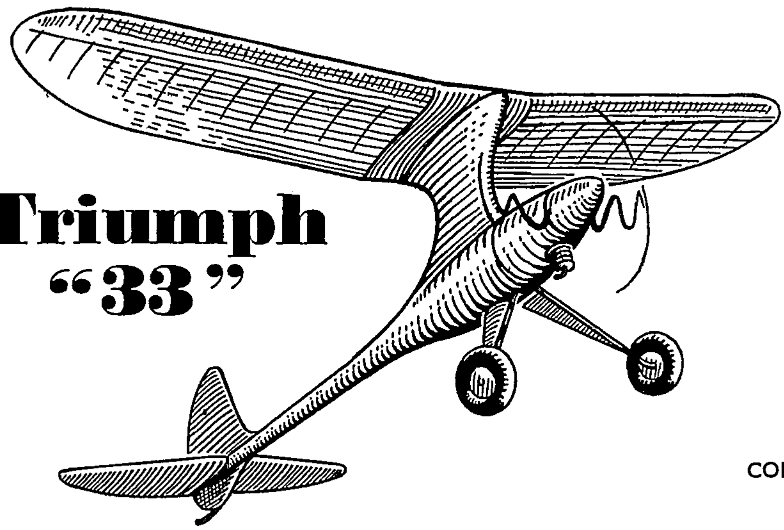
Here we have the 28½ inch span "Sidewinder" SUPALUPA—a certain winner in Stunt Control Line contests—easy to build and a thrill to fly !
Beginner and expert alike will find this an easy-to-construct, sturdy model with unusual stunting ability.
The model has been extensively flown with the E.D. Competition Special engine, but any engine of similar capacity can be installed.
Several pre-fabricated parts are supplied, including a ready-formed spring wire undercarriage.
Wing Area : 170 sq. ins. Span : 28½ ins. 6-in. Chord.

COMPLETE KIT **25/-** *(Post 6d. extra)*

STUNT CONTROL LINE "SUPALUPA"

Double Design Triumph by Aeromodels

Triumph "33"



The "TRIUMPH" literally flew off the drawing board, and on its first flight the model disappeared from sight with a 30 second engine (Frog 100) engine run.

Other models were tested and their spectacular climb and long floating glide makes the "Triumph" a sure winner in any contest.

So many prefabricated parts are included in the kit that little more than assembly is required to get this fast and robust model airborne.

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Send 2d. in stamps for our fully illustrated catalogue describing the above ; also our range of DIESEL FLYING SCALE KITS, RUBBER FLYING SCALE and DURATION KITS.

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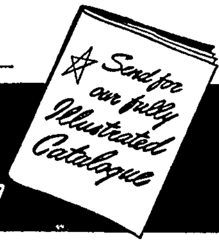

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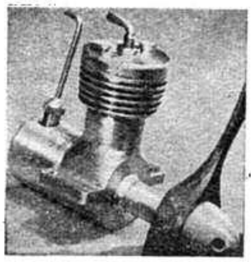

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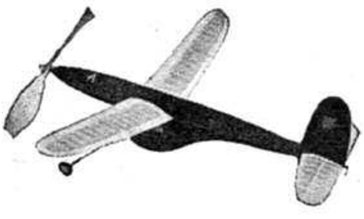

The "JAGUAR" kit by Halfax Models Ltd. Super quality balsa, specially carved propellor. A complete kit, price 21/–

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KAN-DOO control line model that won the Gold Cup for Stunt Models, 1948. Kit contains propellor. All parts cut to shape, rubber wheels, cut-out ribs, etc. Price 25/–.

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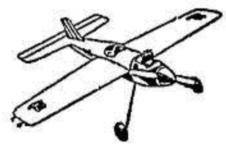

Retail Price **25/-**

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Demand for these dependable fuels with their distinctively labelled bottles increases steadily all the time. The attractive leaflet shows clearly which fuel should be used for various engines. NOW MERCURY Brand ETHER and MERCURY OIL are added to the range.

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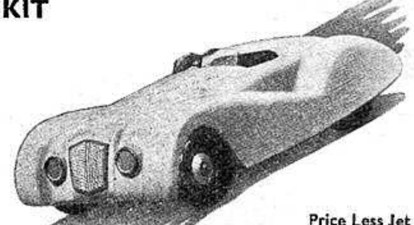
JET CAR KIT



Price Less Jet Unit No. 2.

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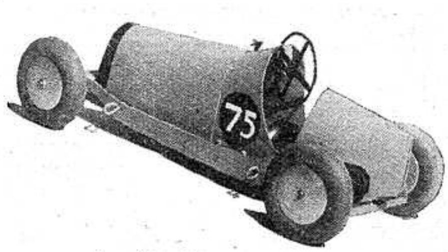
Make this modern streamlined jet-driven car, specially designed by G. H. Deason, Editor of *Model Cars* to be powered by the famous Jetex solid fuel units. The Jetmobile is intended for use with Jetex 350, and so fitted will run at 50–60 m.p.h. Fitted with Jetex 200 rather slower speeds will be recorded. The construction kit is complete with shaped members for the car, coloured dopes, cement, parts for special springing, balloon type celluloid wheels, parts for headlamps and steering wheel. Full illustrated instruction leaflet and working drawings. Anyone who can make a model plane can make a Jetmobile; they can be run in any fair sized room, playground or garage.

The finest and simplest kit on the market that makes up into a model that not only looks right, but is right!
NO SPECIAL TOOLS REQUIRED! Screw-driver, hand-brace, a few drills, soldering iron, will build this "kitchen-table special" model car construction kit.
DIMENSIONS: OVERALL LENGTH 12½ ins., WHEEL-BASE 9¾ ins., TRACK 5¼ ins. Suitable for any engine 1–2½ c.c. Runs on track 12–70 ft. diameter. Really complete prefabricated kit, aluminium body, torque reaction (friction) drive, flywheel (fit Mills 1·3), wood and alloy hubs, special Sorbo rubber tyres. Every nut and bolt is there, 16-page, illustrated, 2,500-word, step-by-step instruction book and plan. Full spares service.

KITTEN CAR KIT



Immediate delivery. Price Less Engine (No. 1.) **75/-**

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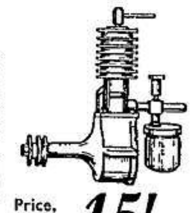

DIESEL ENGINE CASTINGS. Build this Sparey "babe" suitable for model aircraft or Class C cars. Six pieces, five in aluminium for crankcase, crankcase cover-plate, cylinder, carburettor top and fuel tank, and in brass for carburettor body. 2,000-word instruction leaflet, full-size drawing. (No. 8.)

Price, the set **15/-**

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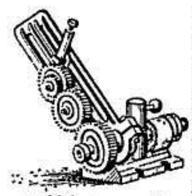

Solves problem of dividing in the lathe cheaply without dividing plates or worm gearing. Original patterns, massive to stand heavy machining operations. Can be machined entirely on 3½ in. lathe. 1,500-word construction and operating notes and full-size drawings. (No. 3.)

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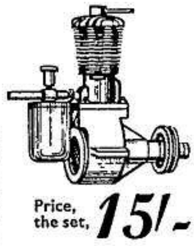

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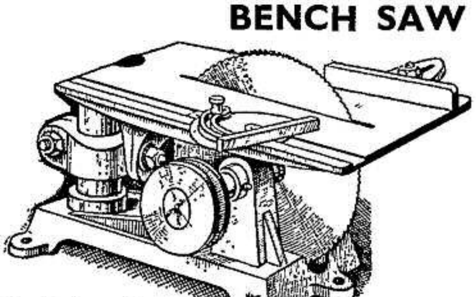
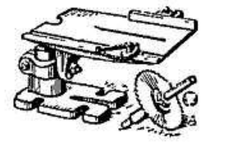


Best in the world.

What other has these points? (1) Phosphor bronze bearings. (2) Ground spindle. (3) Three-point bolting fixtures. (4) Rise and fall table. (5) Tilting table. (6) Adjustable width fence. (7) Protractor quadrant angle guide. (8) Cutting maximum 1½ ins. thickness. (9) Six-inch circular wood saw. (10) Pulley for motor or treadle. (No. 4.) Price **£5·12·6**



LATHE SAW TABLE. As above, but with 4 in. saw for use in lathe. Saw mounted on arbor for use between lathe centres. Base for lathe cross-slide attachment. (No. 5.) Price £4.19.6.

CASTINGS ONLY FOR BENCH SAW, complete with drawing and full instructions (No. 6.) Price 30/–.

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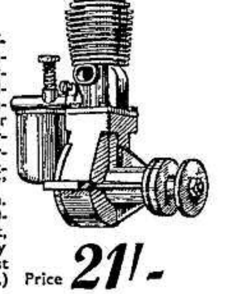
2·8 c.c.



"BUZZARD" CASTINGS comprise all high-grade precision *diecastings* (never before available for amateur construction!). Cylinder and crankcase in "super-dense" aluminium. Carburettor top and crankcase cover in "Mazek" alloy for super strength. Set of 4 castings, 2,000-word instruction leaflet, full-size plan and money back guarantee against faulty castings. (No. 10.) Price **21/-**

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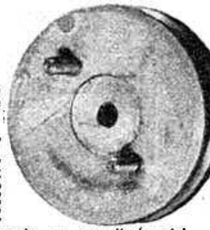

For Class C Cars or test bench running. Specially made Mazek flywheels with starting groove, and engaging dogs, to fit Mills 1·3 or similar engines. Exactly as supplied with Kitten Car Kits, and previously sold at 10/6. Large demand renders reduction possible. Send at once. (No. 12.)

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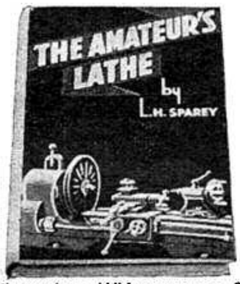

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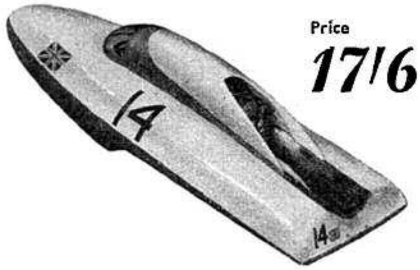
"HYDROJET" JET-DRIVEN BOAT!

Sheer lines of this racing jet driven model boat will appeal to all. Kit comes to you complete with all parts—the more difficult of which have already been prefabricated. Coloured dopes, cement, balsa and plywood, metal parts, full illustrated instructions and working plans.



Price **17/6**

Designed by M. C. Cowell for use with Jetex 350 solid fuel unit, and made under licence from Wilmot Mansour and Co., Ltd. Everyone will be building the Hydrojet. (No. 21.)

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Is there any Limit?

No! Buy as much as you feel you can afford. We make no enquiries, and leave it entirely up to you to know your own finances best. In the lower range as there is naturally a lot of extra work for us, we cannot offer credit terms for less than 10/- worth of goods.

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Simply fill in the order form with what you want and send off to us, with your first deposit; you receive goods by return.

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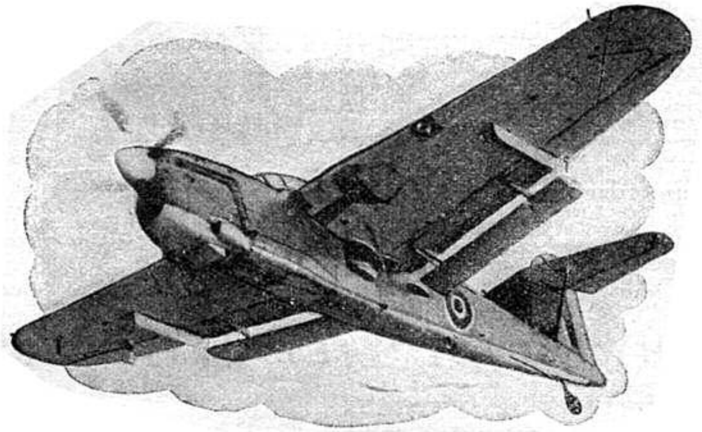

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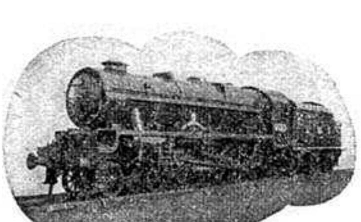

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THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

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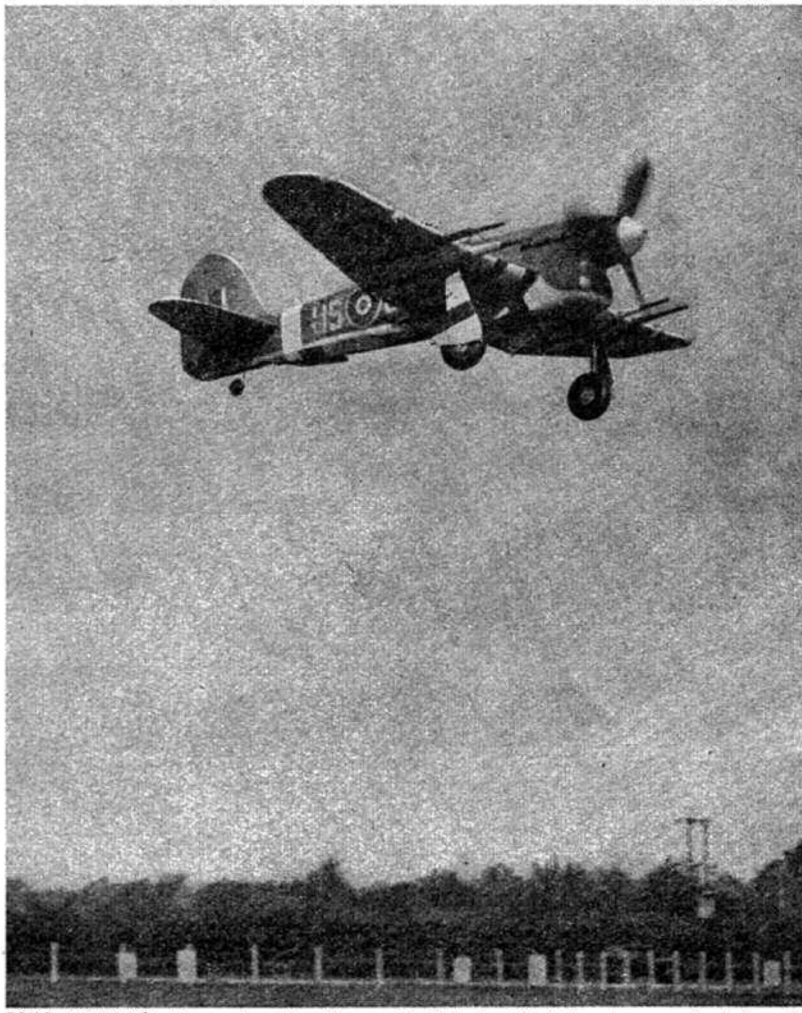

SCALE PERFECTION. One can almost hear the roar of a "Sabre" as this Typhoon passes overhead. In reality it is the whirr of a rubber motor from C. R. Moore's splendid flying scale model that attracts.

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VOL. XIV No. 155 DECEMBER, 1948

WHILST the primary purpose of my recent visit to America was to attend the Wakefield contest at Akron, Ohio, second only in importance was the wish to meet personally the considerable number of American modellers, Aeronautical Publishers, and business executives with whom, during the past ten years, we of this Journal have built up steadily increasing contacts.

There was, however, a third reason for the visit; and that was to study the model aeroplane movement in the U.S.A. both from the angle of the aeromodellers themselves and also the model trader. Fourthly, there was the obvious and natural desire " to see what America was like ", as I had not before visited that country.

We made the journey London-to-New York and return by air, travelling both ways by American Overseas Airlines. On the outward journey we left London Airport at 8 p.m. on Friday August 20th, and, flying via Prestwick, Shannon, and Gander, reached New York some 23 hours later. We flew in a 34-seater " Skymaster " and had a most interesting and comfortable journey despite a strong head wind which, as we approached Newfoundland, reduced our ground speed to as little as 110 miles per hour and our height to some 2,000 ft.

The service provided by the American Overseas Airlines, was literally first class; meals and drinks were served en route; the seating was very comfortable, and the noise considerably less than that in the London Underground. In turn, we read, ate, chatted and slept and were really fresh on arrival at New York, where we were greeted by Irwin Polk both in person and by a pleasantly worded little note of welcome which we found awaiting us in the Customs Offices.

Whilst in New York we stayed at the Prince George Hotel, South 28th Street, 5th Avenue, where we were comfortably accommodated with all the usual American, but somewhat " Anglicised " amenities, since this hotel specialises in catering for Britishers and is furnished in " ye olde Englishe style ". Our trip was made the more pleasurable, in that Mr. and Mrs. Len Stott had arrived the same day by boat, and were staying at the same hotel. Hospitality extended to us by Mr. and Mrs. Irwin Polk, Frank Zaic and his sister Christine, Mr. and Mrs. Ray Arden; and all the other Americans we met, was in the best of the American tradition. This was accompanied and supported by an unlimited and greatly varied food supply, and " illuminated " overall by the bright lights of Times Square at night and a sun temperature of 100° F. in the shade during the daytime.

Whilst Mr. Rushbrooke devoted his time more particularly to the Wakefield contest and to the aeromodelling movement, I personally, endeavoured to gain a more general picture of the aeromodelling scene and an assessment of the strength and position of the model aircraft trade throughout the country.

To this end I spent a considerable time in the company of Mr. Irwin Polk, availing myself of his kind invitation to travel out and back to Akron in his car; whilst Mr. Rushbrooke flew out and back with the British Wakefield team per American Naval Aircraft. In the course of my American motoring I travelled close on 1,500 miles mostly at the " normal " speed of 65–70 m.p.h., taking quite in my stride close on 500 miles between 7 a.m. and 11 p.m. (shade temperature 101° F.) in one day.

At the conclusion of the contest Mr. Rushbrooke returned to New York with the British team, whilst Mr. Polk and I went on to Cleveland where we were privileged to inspect the latest American Aeronautical Research Station (including the world's largest 85,000 h.p. wind tunnel) by courtesy of that well known aeromodeller Chester Lanzo, who is a member of the Station research staff.

We then visited and were shown over the factory of the Cleveland Model Supply Co., one of the largest kit manufacturers in the country. From there we travelled on to Niagara, the falls of which were viewed and filmed both from above, below, alongside and also from the Canadian border.

After returning to NewYork and " resting " for a day in the comparative coolness of 80° F. Mr. Rushbrooke and I travelled to Danbury, Connecticut; where as the guests of the Bard-Parker and Micro-bilt Companies we were entertained and escorted round their factories; later we spent the night with Mr. and Mrs. Ray Arden at their beautiful house on an island in a lake overlooking lovely wooded country and situated some miles outside the city.

Following our return to New York, we were entertained to lunch at the Hotel Martinque by American members of the Model and Aeronautical Press.

In addition to the above described " comings and goings ", we held a considerable number of business meetings with various executives of the firms with whom we had been in contact; whilst every evening was occupied in being entertained, or " returning the compliment " to our hosts. It was only by some competent staff work on the part of Mr. Beverly Smith that I was able to find time to visit New York's most

AIRBORNE EDITOR

A SHORT REPORT BY THE MANAGING EDITOR FOLLOWING HIS TRIP TO AMERICA TO REPORT ON THE "WAKEFIELD TROPHY" CONTEST HELD AT AKRON OHIO.

Beverly D. Smith, well known aeronautical photographer, took this photograph of Mr. Rushbrooke flying in a "Aeronca" floatplane, over New York.

prominent land mark, the Empire State Building; and *that* only a matter of two hours before I caught the 'plane to return to England.

This return trip was made by 42-seat "Constellation", which we found in all ways as comfortable as the "Skymaster"; the service provided by the crew being only equalled by that we received on the outgoing.

Leaving New York on the evening of Friday, September 3rd, we stopped for an hour or so at Gander; and then made the flight direct to London Airport which we reached exactly eight and a quarter hours later. We flew most of the way at the height of 19,000 ft. (pressurised) and having the advantage of a following wind of some 107 m.p.h. put up an average speed approaching the 350 m.p.h. mark.

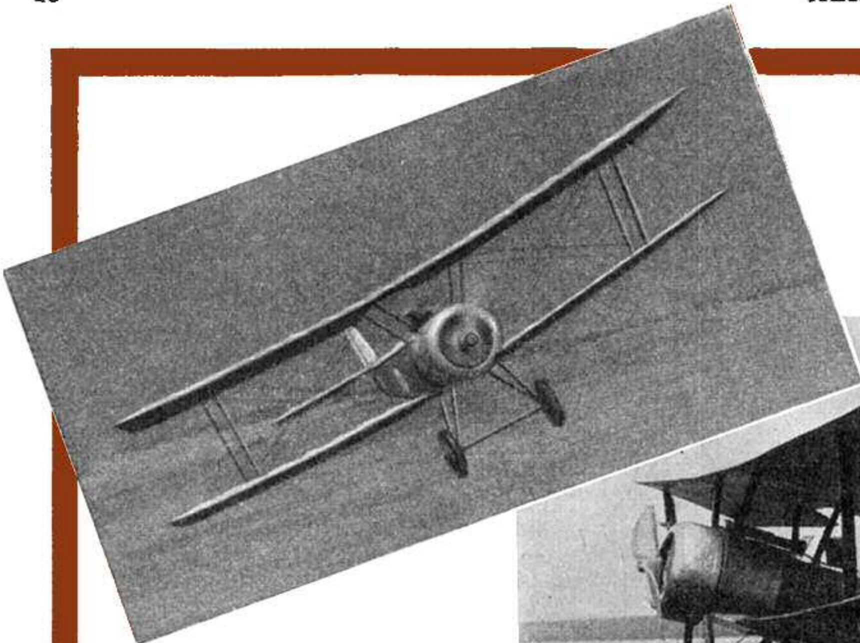
And now, what of America and Americans; and would I like to live there? Well, of course, I can only speak of what I saw and that was a very small proportion of America. The Eastern States are several *thousand* miles away from the Western States. Features which immediately caught the eye were the width of the roads, the complete absence of hedges and cuttings, and the continued "hum" of the myriads of crickets which seem to be everywhere. This "hum" has to be heard to be believed. It is so much a part of the American Scene that the Americans themselves are quite oblivious to it. However, even with the car travelling at 70 m.p.h. on the highway, and the nearest grass at least 50 or 70 feet away, this "hum" can be heard quite clearly from inside the car. There seems to be very nearly a complete absence of bird life, which very likely accounts for the continued existence of the crickets.

Most of the houses are completely wooden and only the larger ones and not all of them, are fenced in. Grass grows from the footwalk right up to the house fronts, very much like we have seen in the American films shown in this country. There are plenty of trees and shrubs round the houses, but only very rarely does one see flowers cultivated, hence there is very nearly a total absence of the bright colours such as we have round our houses here in England. In most of the houses can be found colourful displays of flowers—practically all of them artificial. I do not think there can be more than one or two florist shops in the whole length of 5th Avenue and in fact I cannot recall anywhere seeing real flowers, except a bouquet in front of the Chairman at the Wakefield banquet, and even these I learned were brought along by one of the lady organisers who had cut them from her own garden "because *she* was so very fond of grown flowers".

American bicycles are quite different to ours. Few have mudguards, none have bells; and rim brakes are quite unknown. American bikes do not have three speed gears, have tyres twice the size of ours, and for braking rely on "back pedalling" type of mechanism. They are constructed a good deal more robustly than ours and are painted in gay colours. They have no lights, and are only ridden by juveniles, (any juvenile over the age of 16–17 would have his or her own car). Bikes are ridden only by the youngsters in the vicinity of their homes and the local shops. Cycling clubs are unknown and I think that a group of cyclists on one of the main high-

(*continued on page 56.*)

Hosts to Messrs. D. A. Russell and C. S. Rushbrooke at a luncheon party given for them shortly before they left to return to Great Britain . . .
Standing (left to right) Walter McBride, Production Manager Air Trails; Irwin Polk, Managing Director of Polk's Model Crafts; Cal Smith, Editor of Flying Models; Len Stott, Captain of the Wakefield Team; Internationally known modeller Frank Zaic; Al Lewis, Editor Air Trails; Beverly Smith, Aeronautical Photographer; Charles Penn, Publisher Model Craftsman; Howard McEntee, Editor Model Airplane News; Arthur T. Joyce, Model Craftsman.
Seated at table (left to right) Larry Isenger, Model Editor, Mechanix Illustrated; Walter Holze, Editor Flying Models; Messrs. Russell and Rushbrooke; Mrs. L. Stott; Miss Christine Zaic; J. Mann, Production Manager, Model Airplane News; Nathanial Polk; Lee Treadwell; Toys and Novelties.



The photos on the opposite page show a line-up of three old timers with the Pup in the middle. The other two models were built by G. E. Fisher's friend J. M. Greenland, designer of the Bleriot Monoplane and D.H. Chipmunk recently featured in our scale series. The model on the left is an S.E.5, that on the right being a Camel.

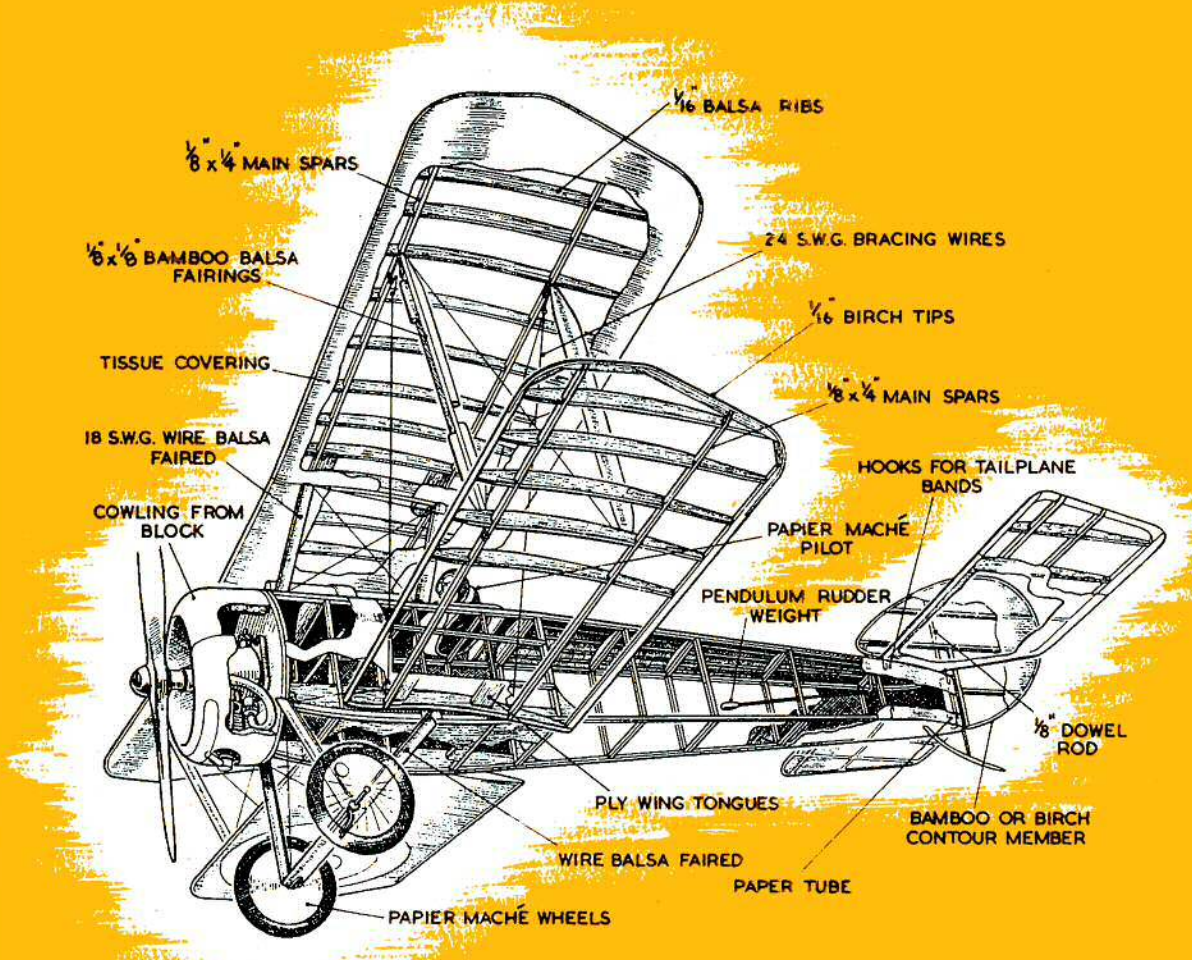
1½ INCHES TO 1 FOOT FLYING SCALE

SOPWITH PUP

BY G · E · FISHER

Neither gone nor forgotten this great aircraft survives the ravages of time—a Pup still flies today. And now, in many places the atmosphere of the 'old days' will again be recaptured by the flying of this superb power model whose flight faithfully follows that of the original machine. Following in the tradition of Bagley and his popular Bishop's Nieuport 17C, the model 'Pup' described in the pages of this article is equipped with the same built-in stability device, the automatic 'pendulum' rudder which makes light of one of the most difficult features of true scale model design.

The true to scale appearance of the model Pup is well brought out by the three photographs on this page. Shown at rest and in the flying shot at the top of the page these photographs by E. J. Riding convey much of the realism of G. E. Fisher's 1/8th scale model.


1/16" BALSA RIBS
1/8" x 1/4" MAIN SPARS
24 S.W.G. BRACING WIRES
1/8" x 1/8" BAMBOO BALSA FAIRINGS
1/16" BIRCH TIPS
TISSUE COVERING
1/8" x 1/4" MAIN SPARS
18 S.W.G. WIRE BALSA FAIRED
HOOKS FOR TAILPLANE BANDS
COWLING FROM BLOCK
PAPIER MACHÉ PILOT
PENDULUM RUDDER WEIGHT
1/8" DOWEL ROD
PLY WING TONGUES
BAMBOO OR BIRCH CONTOUR MEMBER
WIRE BALSA FAIRED
PAPER TUBE
PAPIER MACHÉ WHEELS

The Model. Powered by a "Frog 100" diesel, but will fly with any engine of similar capacity; it was tested with a ·9 c.c. "Clan" engine which proved to be lacking in sufficient power. Simplicity and strength were the keynotes in the design, the undercarriage being sprung in the true scale fashion, i.e., with rubber band shock absorbers. The wings and engine mounting can knock off in the event of a crash.

Fuselage. The fuselage is built as a normal slab-sided box structure of 1/8 inch square hard balsa. Commence by building the two sides flat on the plan, afterwards joining them together with the various top formers, cross spacers, etc. Then bend the centre section struts to the shape shown on the plan from 18 s.w.g. wire and bind in place. Next, add the side formers, stringers and sheet. The cowling is carved out of hard balsa in two halves the top half being plugged into the lower half which is cemented to the 1/8 inch ply front former, which is in turn held to the fuselage by means of strong rubber bands. The engine is bolted to this former, 5 degree sidethrust being obtained by packing with washers.

Wings. First pin down T.E. and L.E. to the plan. The mainspars will have to be packed up with pieces of sheet to allow for the undercamber, when this has been done add the ribs, then build up the tips with 1/16×3/16 inch hard balsa, when dry steam 1/16 inch square bamboo to shape and cement on. Next, make the 20 s.w.g. wire strut lugs to shape shown on plan, then bind and cement firmly in place at an angle allowing for the stagger and dihedral of the wings.

Undercarriage. The undercarriage is built up by bending 16 s.w.g. wire to the shape shown on the plan, then add hard balsa fairings bound with thread at the ends, and cover with four layers of tissue. The spreader bar is fixed to the "Vees" of the legs, the springing is obtained by retaining the axles into the "Vees" with rubber bands.

Centre Section. The centre section is built as per the wings and bound on to the ends of the centre section struts with thread.

Tailplane and Rudder. An automatic rudder was fitted experimentally and proved to be very successful, its construction being simple as is the tailplane's and needs no explanation.

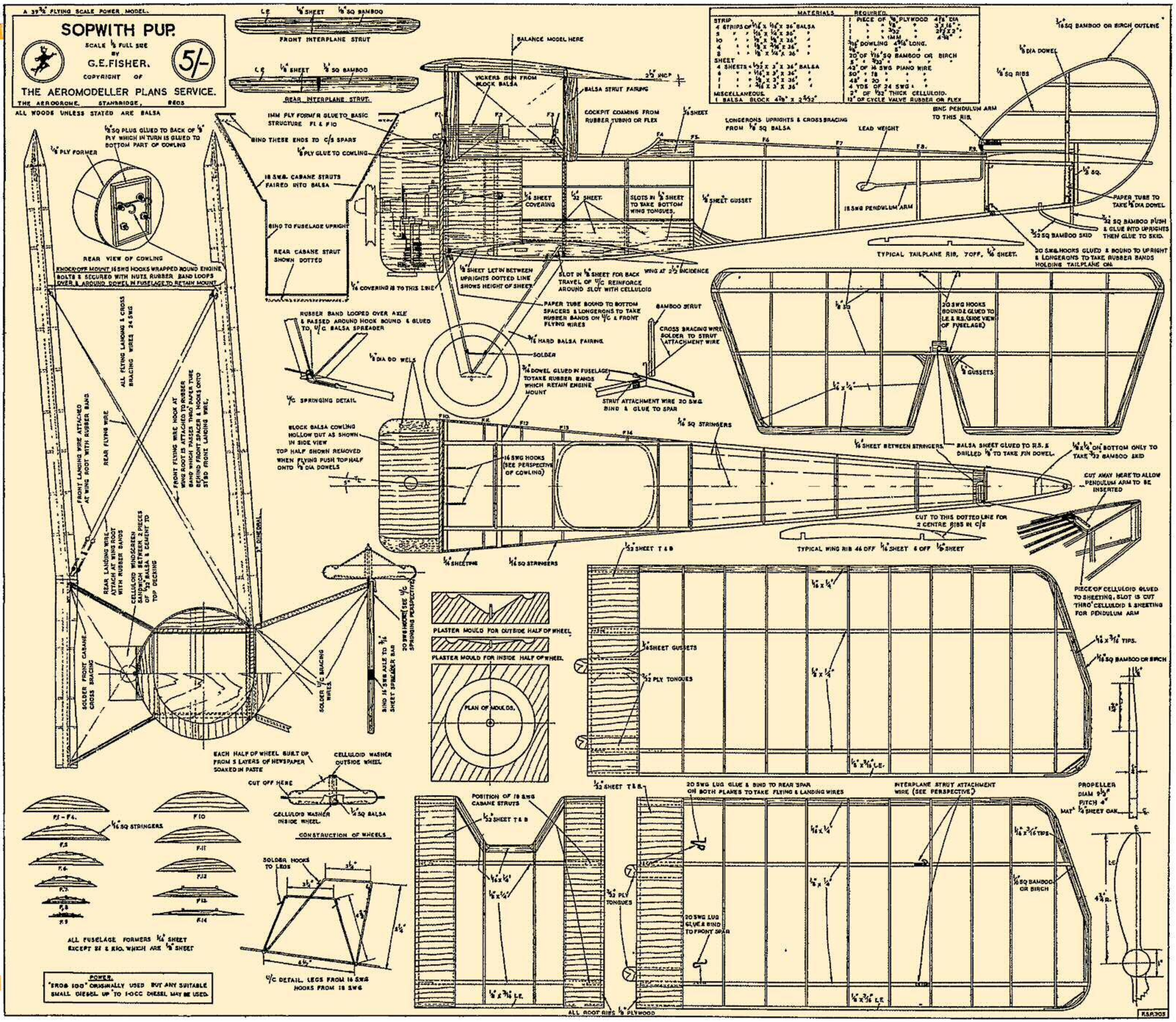
N.B.—It is essential that nothing can jam it to one side or the other of its celluloid slot.

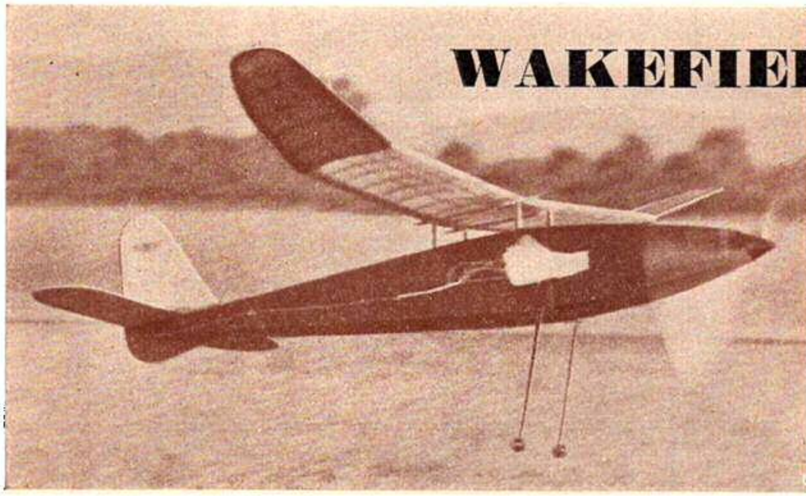
Covering and Finish. The whole model is covered in rag tissue and given one coat of clear dope, the colour scheme being as follows:—The cowling and top decking of the fuselage is painted aluminium back as far as the cockpit, the rest of the fuselage and upper surfaces of the model being painted khaki-green, all under surfaces being dirty cream to represent clear doped fabric. The red, white, and blue roundels are drawn on with compasses and then painted, the fin is painted white with the Sopwith name and address printed on it in black, the rudder is painted red, white, and blue with the blue adjacent to the fin post.

Rigging. Attach the wings to the fuselage and pack up to the correct angles of dihedral and incidence, then bind the struts to their respective lugs, and cement on balsa fairings. Next, attach the landing and flying wires, and the cross tie wires between the struts which are soldered to the lugs.

Flying. The prototype has a considerable number of minutes to its credit and was tested as follows:—Make sure that the model balances on its correct C. of G. (shown on the plan) then glide as near to the ground as possible. Should it stall add pieces of packing under the leading edge of the tailplane, if it dives pack up the trailing edge. Continue until a flat glide is obtained. When gliding it is advisable to fix the rudder central, when ready for power flight allow the rudder to move freely and let the model R.O.G. with about 30 seconds motor run to get model well clear of ground. If the model stalls under power add downthrust, should it turn steeply in the anti-torque direction cut down the amount of rudder travel, but if it turns in the torque direction add more sidethrust.

Full size plans (¼ scale opposite) may be obtained from Aeromodeller Plans Service, The Aerodrome, Stanbridge, near Leighton Buzzard, Beds. Price 5/–post free.





WAKEFIELD MODELS

Part One

BY R. H. WARRING

With the 1949 Wakefield Contest due to be held in this country, readers will welcome this new and practical series by one of Britain's leading exponents of the Wakefield art.

J. L. Pitcher's parasol slabsider employing a folding prop. A model which has proved its merit in the last few seasons.

BILL WINTER, past Editor of " Air Trails " and a stout power model enthusiast himself, just about sums up the true feeling of all contest-minded aeromodellers when he said—" If there is one event we would like to win, it would be the Wakefield."

The Wakefield is more than just another International contest. It is, in effect, the unofficial World's Championship—and perhaps not so " unofficial " at that. The type of model called for by the present specification is almost universally admitted to be the finest class of contest machine, and one which demands more skill, both in designing and trimming, than any other type.

Looked at from the point of view of a contest flier, the Wakefield is more *satisfying* than its glider or power model contemporaries. Optimum performance with a rubber model is only achieved by careful attention to trimming in order to get height under power, followed by prolonged glide. The contest glider only fulfils half this requirement. Height is readily and easily obtained by tow launching—and producing a glider design stable under tow is considerably simpler than producing a rubber model which is similarly spirally stable under power. Power models are almost invariably designed to accommodate motors which provide a considerable excess of thrust, so here again height is easy to achieve. It simply boils down to one essential requirement of a stable design.

To watch a Wakefield climbing to a height of three or four hundred feet during a power run of a minute or more is far more satisfying than seeing a power duration job reach a similar height in a vertical climb in a matter of seconds, or towing a glider up to the full extent of the line. Only in the case of the Wakefield is the height reached a true reflection of the flier's skill and ability.

Power duration flying has now developed to the stage where almost any reasonable modeller—beginner or expert—can reach thermal height and fly models away quite readily. The same is fairly true in the case of gliders. But the Wakefield flier still has to learn and develop his skill in this particular field by *experience* before he can achieve comparable results.

This is quite well illustrated by the fact that plans (and several kits) of many leading Wakefield designs have appeared over the past ten years. The originals have probably compiled quite an impressive list of achievements in the hands of their designers. Yet very seldom does the average modeller who builds a replica from the kit or plan even approach similar results. In fact, about the only notable exception to this rule is the Jaguar, present Wakefield holder, which to the knowledge of the writer is the first time the winner of the Wakefield has flown a model not of his own design. Here, actually, the comparison is not quite true, for the Jaguar has been adopted as a club design, about which more will be said later on when discussing " design development ".

Now contrast the above state of affairs with that in the power model field. Here the relatively unknown modeller building a Banshee can top the British Nationals—and even in America the ordinary club flier who builds a Zipper or Sailplane from a kit is admitted to have as good a chance in an important contest as any expert.

But let us not form the wrong impression of the Wakefield. It is, admittedly, a more specialised machine, but Wakefield contests are by no means a " closed shop ". The luck element is still present and, up to this year at least, the Wakefield itself has been largely won on the strength of one particularly good flight. In fact, Chesterton's performance this year is probably the most *consistent* as regards excellent flight times in the history of the event.

Although established in 1928, the Wakefield Trophy did not achieve a large popular following until about 1936, the year which virtually marked the introduction of the streamliner as a potential contest winner. Although to the old rules (4 ounces minimum weight) R. N. Bullock flew a full streamlined job in the trials. That he did not place in the team was due to the fact that he shed a wing on one flight and consequently ruined his chances. But this design—a circular fuselage with stringers, and shoulder wing position—fathered the subsequent streamliners.

The present rules were established in 1937, calling for a minimum weight of 8 ounces. The outcry at the time was tremendous, for most of the fliers considered that the increased weight would ruin performance. Subsequent events have proved them quite wrong. The eight-ounce machine has been developed to have a much higher performance and now once again the subject of further weight increase is topic for discussion. There is much that can be said on this point.

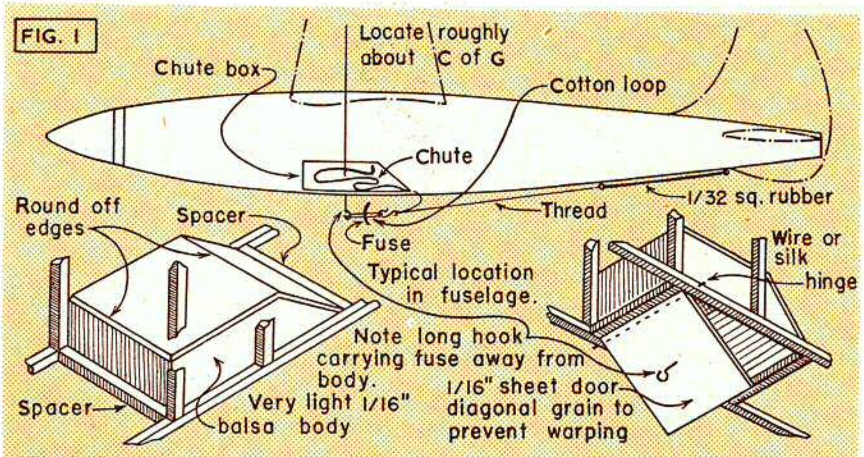
Contrary to many opinions the present eight-ounce Wakefield has not been developed to its possible limit. Admittedly the first class Wakefield of 1948 is a machine which flies away very readily when properly trimmed and a dethermaliser is an absolute essential. But there is still more work to be done before the present specification is exhausted.

As regards external appearance, the leading Wakefields of 1948 differ very little from their 1939 counterparts. They are, perhaps, a little cleaner in the aerodynamic sense, but the majority of improvements have been confined to structural design and detail. All streamliners, in particular, look very much the same and there is very little that can be modified here as regards aerodynamic shape. The ordinary post war slabsider is very similar to the pre-war slabsider, with generally cleaning-up in the region of the undercarriage. Folding propellers have been developed for slabsiders and are widely used, notable examples being those of Pitcher and Piggott, both of the Croydon club. The only other markedly successful departure from the 1939 shapes are the Jaguar—a very fresh approach to the problem—and the writer's own series of streamlined-slabsiders.

Despite this apparent lack of development, however, average performance is now higher than pre-war, which is a true indication that the brood has improved. When at the same time it is realised that present day rubber is definitely inferior to rubber available in 1939, it will be appreciated that actual development has, in fact, been considerable.

Stories of four and five minute still air flights in still air in 1939 can be largely discounted. No doubt such flights were made, but " still air " is one of those " idealistic " quantities very rarely achieved. The writer has, for example, had a flight of 25 minutes 47·4 seconds o.o.s. upwards in supposed still air at eight o'clock in the evening, with a Wakefield two days before the Gutteridge Trophy this year!

The fact remains that the pre-war Wakefield contest flier would reckon to place with a two minute average in poor conditions. Now he would require an average of somewhat in excess of three minutes.



STANDARD DETHERMALISER UNIT—ESSENTIAL FOR ANY CONTEST WAKEFIELD

The only way to check still air performance of models is to fly over a considerable period in evening air and time flight duration against turns. Flights that average out around the same level of still air of turns are a pretty fair indication of still air performance. Obvious discrepancies would be ignored.

Analysing the present Wakefield field we then find very few modellers capable of an extremely high and *consistent* still air performance. Many, in fact, approach the subject from an entirely different angle and design for thermal conditions. That is, they may evolve a design where the prime consideration is to gain a lot of height rapidly and then rely on thermals, coupled with a good glide, to boost flight duration. And thermals are generally around on most normal days. The still air duration of such models may be rather on the low side—say around two and a half minutes—but average contest figures will probably be much higher, boosted by long thermal flights. Generally models of this type either do exceptionally well or very poorly.

The other school of thought works on the principle that, given a model with a very high still air duration its chances of picking up a thermal should be as good as that of the other type, with a much higher *overall* flight average.

Comparative figures are hard to obtain from different sources. Most of our leading Wakefield fliers are a bit reluctant to pass on accurate information regarding their private testing and development—all too often it is unflattering! Hence the following figures are based largely on the writer's own experience.

The five-minute " still air " Wakefield is now a possibility, but just that little bit of extra development work is needed before this figure is achieved. It would, therefore, be rather tragic if the present rules were so amended as to demand development along some other line. Given a good basic design it appears relatively easy to trim a Wakefield up to the three minute mark on 80–90 per cent. turns. In fact, a Wakefield which will not approach this figure just is not good enough for serious contest work. It may pay off, of course, but will have to rely on luck to do so. And luck is not something on which you can rely for consistent performance.

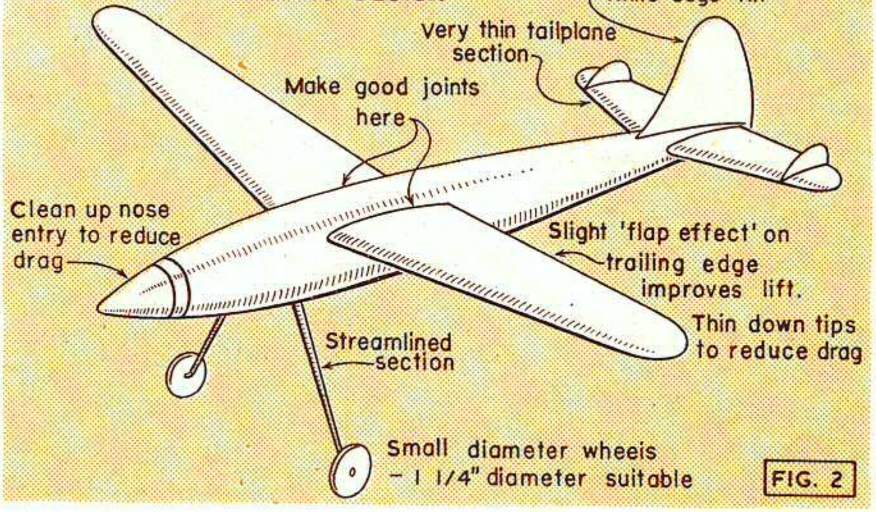
The next step in boosting performance is very hard to define. The difference between three and four minutes as regards change in trim or other tangible features is extremely slight. Generally it comes by improving the glide by very careful trimming, cleaning up the design where necessary—such as improving wing-fuselage joint, nose entry and so on.

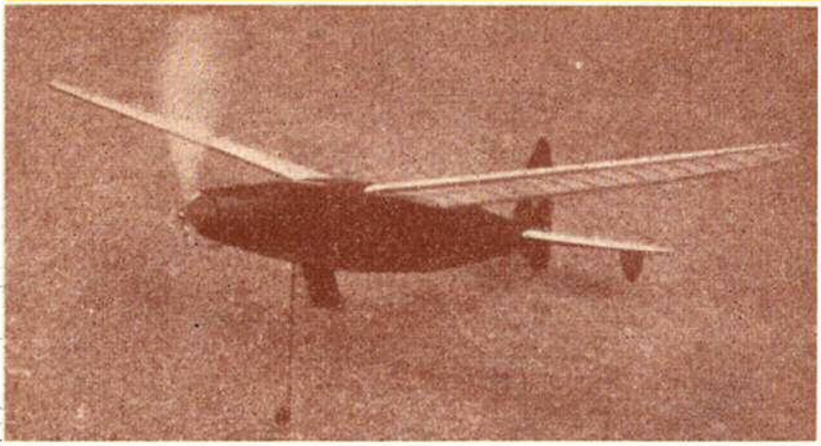
Speaking of the writer's own models as an example, trimming for three minutes still air average on 800 turns with good rubber was relatively easy, but with very little actual trimming change flight times could be boosted to four minutes under the same conditions. In fact, both of the two specialised streamlined slabsiders trimmed to the limit for the Wakefield Trials had a still air figure of four minutes forty-five seconds on 1,000 turns. Maximum possible turns with the motor concerned was around the 1,100 mark, although it was never deemed advisable to approach this figure. Thus given slightly better rubber, a slightly cleaner model, or a few more turns on the existing motor and the five minute mark would be achieved.

However, a very interesting point must be noted here as one which has bothered the writer for a number of years. Most models, and rubber models in particular, appear to suffer a change in trim under different air conditions. That is to say a model trimmed absolutely " spot on " to, say, the five minute mark in still air will not necessarily repeat that performance under different conditions, although apparently exactly the same as regards trim, with the same motor.

The first thing to suspect when any inconsistent results appear is motor fatigue, but with a good rubber this is largely over-rated. Some rubbers do fatigue readily and certain

CLEANING-UP EXISTING DESIGN





introduced in the breed, the writer in particular feels that the rules should remain as at present, with the exception of introducing the five-minute limit. Given a year or two of this we should be able to produce something amazing in the way of consistent high times with rubber powered models—the final onus then being on the rubber manufacturers to produce the strip required for an extremely exacting task.

The present *size* of the Wakefield is recognised as about the optimum. A larger model, calling for more power, means a motor which requires extreme physical endurance to wind efficiently. The present high-power Wakefield motor is about the limit for safe handling. To increase the overall weight, as has been suggested does not appear desirable from any standpoint if the wish is to *advance* the design.

specimens never give the same torque curve twice. But quite an amount of flight testing was done with a rubber of a type which does not fatigue at all on 80 per cent. turns and the resulting duration turns data still showed inexplicable discrepancies.

Next suspect was centre of gravity movement; for example, moisture collecting on and being absorbed by the covering, increasing the overall weight of the model and upsetting the trim. But it is now considered that this effect is only secondary. Shifting the C of G a small amount, has very little effect on climb, although it may appreciably affect the glide. However, the loss in performance is as much a matter of lack of height under climb as that of poor glide.

It now seems fairly certain that this change of trim *is* due to relative humidity, not in so far as it affects C of G position, but in that it causes a variation in the tension of the covering of both wings and tailplane, with resulting change in rigging angles of these components. When it is realised that a packing strip one hundredth of an inch under the tail may make as much as sixty seconds difference on a four–five minute flight in still air, this does not seem far-fetched. Nothing has yet been done to prove this theory in practice, but the effect of a tailplane structure which will not change in attitude will be tried out in an attempt to gain further data on the subject. Failing that, it would appear necessary to graduate trim against a wet-and-dry bulb thermometer registering relative humidity!

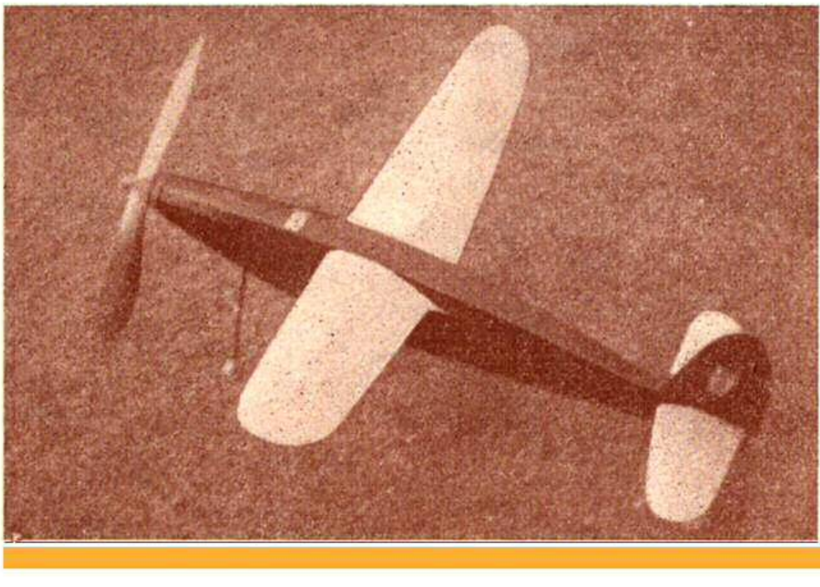
For the reason that there *is* still some improvement to be

Few people, do at present, build down to the eight ounce limit. Particularly with a shoulder-wing model it is extremely difficult to work down to much less than 9 ounces. Take, again, the writer's own streamlined-slabsider design which, by careful selection of materials, weighs 8¼ to 8½ ounces, including a 3½ ounce motor and ¼ ounce parachute. This model was duplicated by a fellow club member from normal stock wood. It required a motor of 3¾ ounces to fly it successfully, and the total weight of that particular model was only just under eleven ounces! Thus, increasing the overall weight of the present specification would mean primarily that you need not build so carefully. In many respects a new minimum weight of ten ounces could be called an attempt to force the streamliner over as the logical Wakefield layout—whereas the theoretical superiority of the streamliner has still to be proved conclusively in practice. At the eight-ounce limit the merits of both types are about equal, for the streamlined-slabsider can be got down to the minimum without sacrificing strength.

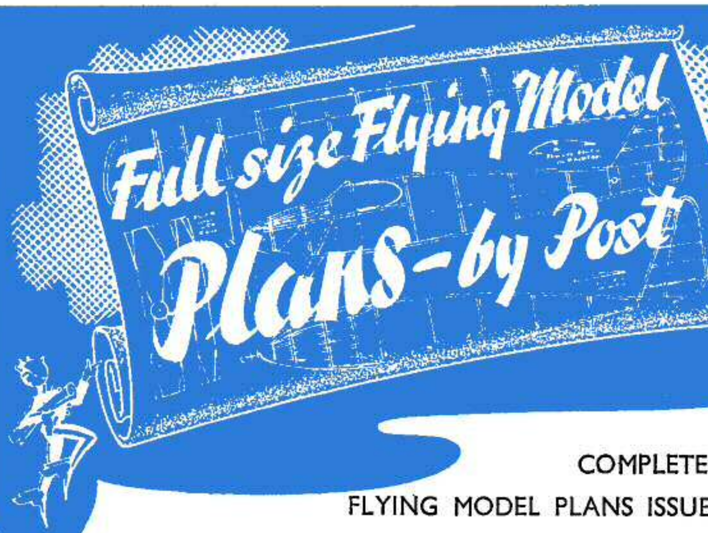
Possibly the strongest argument in favour of keeping the present rules as they are is the fact that they are now Internationally known and widely understood. Any major change in the rules would seriously reduce the popularity of the Wakefield, particularly as the present machine of this type is also well suited for any type of rubber model competition.

As to laying down set rules as to the type or layout of design most suited for contest flying, this cannot, logically, be done. Detail design and development is far more important than specific aerodynamic shapes. The latter are largely a matter of individual preference. The proof of the design is in the handling and subsequent performance.

(to be continued.)



Photographs on this page are of the author's original 1946 slabsider. Note the streamline nose, monowheel undercart and fixed airscrew.



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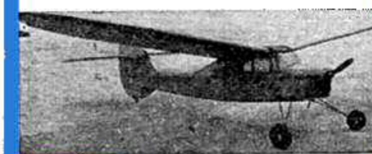

Eros.


Bishop's Nieuport.

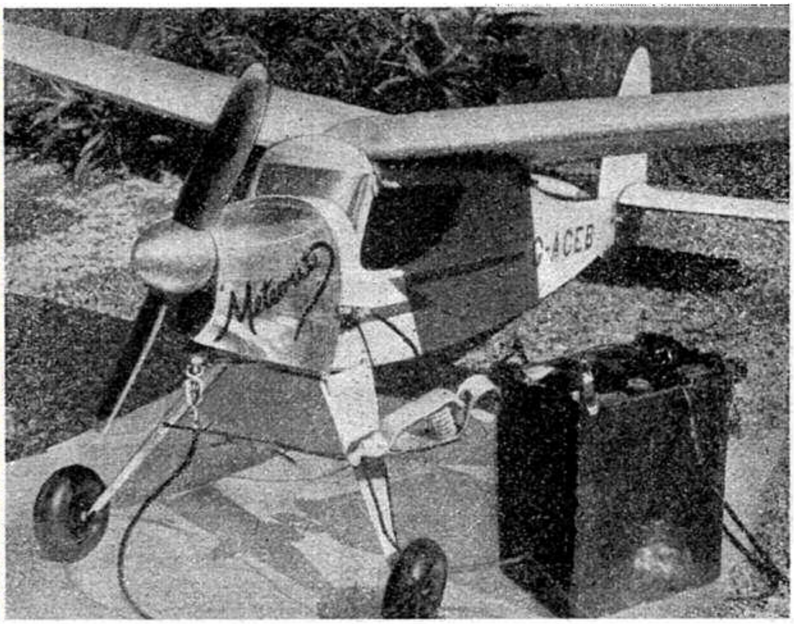

Ladybird.


Chipmunk.

PETROL VAPOUR

BY "C.E.B."

IN THIS ARTICLE WHICH IS BEING PUBLISHED IN TWO PARTS, OUR POPULAR CONTRIBUTOR COLONEL C. E. BOWDEN COVERS THE WHOLE SUBJECT OF GLOW PLUG OPERATION IN DETAIL.



It is surprising how slowly British modellers are making use of the glow plug motor which has swept the American model world by storm. This may partly be because the diesel is such a well developed and satisfactory engine in Britain, and partly because such varying reports are given of the glow plug in England. Whatever the reasons are, I feel sure we shall adopt the glow plug motor with the same fervour that we have caught on to control line flying. That had a lag in time, and we are a "leetle" cautious as a Nation. Good glow plugs are now available in Britain. Suitable fuel is being sold blended by the large manufacturers, and specially designed motors with suitable compression ratios are appearing on the market.

The glow plug engine is so simple in operation, when a properly designed one with plug to suit is provided, and the starting is so easy that one is sometimes tempted to wonder why one now ever uses a petrol spark ignition motor. Actually there is more in it than that. So let us examine this "new" form of ignition and power production in order that we may get a balanced view and not be caught by some silly snag that may put off a newcomer to the type before he has had sufficient experience to make a sound judgment. I called it a "new" form of ignition. In actual fact it comes from the earliest days of motoring, but was given up because road conditions required varying speeds with "pulling" powers from the engine at low speeds as well as at high speeds. The Americans, realising that the average model motor only demands high revolution performance, reintroduced glow plug ignition to suit model work as a "new" type. You may ask, why should it have been found wanting years ago and now be found most useful for our model work?

The reason is quite simple, although it is so important to understand if you are to get results from glow plug motors, for it is the basis of correct use and application.

The model internal combustion engine, except for special purposes such as radio control where a tick over speed may be required as well as an all out speed, suits our general purposes when we have a "flat out" performance, i.e., the engine running near maximum r.p.m. for maximum power.

The glow plug engine must run flat out. It is not satisfactory as a slow speed puller. Its successful operation is ruined if one tries to get slow speed characteristics from it. The type demands propellers to suit high r.p.m., and in fact everything to that end. We will see why in a moment, but let us get it squarely into our heads that if we require an engine for high revolutions then the glow plug motor is the type we are looking for. If we require a "flexible" engine or a slow speed runner then we should look at the spark ignition type petrol engine to suit our needs. The diesel generally speaking has a flat out performance but at lower r.p.m. and with greater torque characteristics.

The main advantages of glow plug ignition motors are: high performance allied to simplicity and low weight to be carried by the model, for once started there is no electrical gear to be carried in flight, etc.

Once we have these facts clear we shall not try to apply the glow plug type to unsuitable tasks. Furthermore *we shall see that our glow plug motor has a suitable propeller that will allow it to attain high revs.* For instance, if we fit too high a pitch and too large a diameter the engine cannot rev., and the performance is killed.

Even the free flight model of slow flying speed can be powered with a glow plug engine if it is fitted with a low pitch prop to suit the slow flight and that permits the engine to rev. The American pylon overpowered rocketing type of model is nicely served by a glow plug engine. Get these facts right and I will bet my best Sunday chapeau that you will soon be happily glow plugging.

Let us then first delve into how the engine works and why it likes revving, and then we can see about plugs and fuels, ending up with operational hints. If you keep this "Petrol Vapour" by you and cannot get satisfactory glow plugging you will be able to shout at me to relieve your feelings. I shall merely point out that you have omitted to do something recommended in my article, and we shall all be happy! But quite seriously you must try this glow plug business. It will get you, and I know you will also still keep diesels and petrol motors in your hangar to suit other moods and models just as I do.

At first sight it would appear to the novice that all one has to do is to fit the cherished petrol engine with a glow plug and give it a drink of a new fuel as prescribed, and the story will end in happy glow plug operation. It may happen this way, but it may not. There is more to it than that, as is usually found in all the compromises of the internal combustion engine. The operator must understand how it works.

Glow plug ignition generally speaking, produces a greater performance than spark ignition. This is aided by reduced weight to be carried by the model. Higher compression ratios with an anti-detonating fuel all have their effect.

How the Glow Plug Engine Works.

The glow plug engine must have a battery to start it, the diesel requires none, and the petrol engine requires a coil and

Left. Starting is best done by a 2 volt accumulator which deals with the heavy drain glow plugs put upon batteries. One clip is attached to the plug. The other is attached to earth on the motor. Immediately the engine starts the accumulator is detached.
Right. The "Nordec" is the largest special glow plug motor of the moment in Britain, and is on American lines of proved performance.

flight battery to be carried as well as a starter boost battery in most cases. Once started, the glow plug motor sheds the starter battery and carries nothing but the heater plug in the cylinder head. The engine goes on running without any electrical spark gear. The special heater plug, generally known as a glow plug, keeps glowing partly due to the platinum element's catalytic action, because of the rapid oxidation of the fuel at the element's surface, and partly due to the heat of the high compression and burning gas. This heat of combustion is important as evident by the fact that a shrouded plug element or a very low compression engine gives trouble. The element in the plug is a coil of thin wire usually made from platinum or platinum iridium. The element is in place of the usual electrodes of a spark ignition engine.

The plug, when connected to its starter battery, glows hot at the element and keeps glowing, and unlike a spark ignition motor, there is no timed ignition spark. There is naturally no need for a contact breaker to time a spark at a certain point of the piston's travel. All we have is this simple plug that glows continuously whilst the motor runs, and a battery to start it glowing at the start-up operation. If a petrol engine is run by glow plug, the contact breaker can be removed as it only creates unnecessary friction and loss of power.

Starting—The Battery—Fuel Supply.

Starting procedure is to heat the plug's element by a *suitable* battery, and I emphasise the word suitable, for this is important as we shall see in a moment.

This raises the temperature of the highly compressed gases in the cylinder so that they ignite and operate the engine by driving down the piston on its power stroke, for the engine is exactly similar to the normal petrol two-stroke except that it should have a higher compression ratio. A 1½ volt dry battery of the heavy duty bell type is used with certain American plugs, but a 2 volt accumulator of the "radio" type is far better for most plugs including those of British manufacture.

The engine starts by the usual method of sucking in and propeller swinging. *An extra rich mixture is advisable for glow plug motors*, so a good choke is given and sometimes a dope from the fuel can. The needle valve is usually set considerably further open than in the case of a spark ignition engine, for the sticky castor oil lubrication allied to a greater fuel consumption of the usual alcohol fuels used demands this. *As soon as the engine starts and runs reasonably well the battery must be disconnected, or the plug may burn out under the combined heat of battery and running temperature of the engine.* Furthermore the engine does not usually give of its maximum power until the battery is disconnected. The needle valve is then adjusted to obtain best two-stroking and power at high revolutions. This is often a rather critical setting. Far more so than diesel owners will be used to. The glow plug now carries on without any further battery heating. The engine runs until the fuel is exhausted, or the mixture becomes too rich or too lean, or the glow plug, if an unsuitable one for the engine, becomes too cold to operate. The mixture strength can alter due to bad design of fuel tank on a control line model because of centrifugal force, or evolutions in a free flight model. As the mixture strength is rather critical it behoves the modeller to see that the fuel flow is really constant. For instance the usual wedge shaped control line tank for fast models should have the fuel pipe line coming away from the flight circle after it has picked up the fuel in the far corner of the tank. This will prevent surging as the model's speed rises and creates more G., thus causing an unduly rich mixture. If on the other hand a normal tank is used for control line flying the fuel will leak out as the speed rises and a weak mixture will result. Cone type tanks such as the tank-cum-mount, as fitted to the "Frog 160 Red Glow" engine, can be used without alteration for inverted flying and other stunts, if the engine is mounted on its side as a "sidewinder", and the external neoprene fuel tube is taken round the tank one complete turn from the side outlet of the tank to the needle valve which now is located below the engine. This stops surging. The fuel filler is of course on its side and has to have a small length of neoprene tube attached and bent upwards which stops a full tank spilling. The model is filled on its side. The outlet is naturally on the outside of the flying circle and the filler on the inside, *see overleaf*. So it must be remembered that fuel flow is very important on a glow plug motor which is touchy on this point.

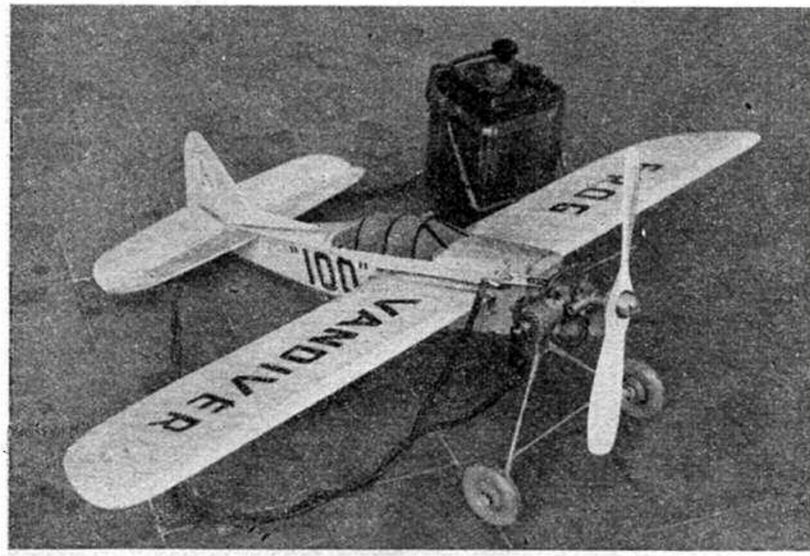
Although a rich mixture is advisable to start, the engine will not run once started on a rich mixture. A rich mixture causes the engine to cut out dead. Therefore a dead-cut usually denotes, "rich mixture".

Plugs whilst starting make an exceptionally heavy drain upon the starting battery or accumulator, therefore even a large bell battery is soon exhausted if the plug is kept "on contact" for more than a few seconds at a time. *It is far easier on the pocket and the temper to use a two volt "radio" accumulator for starting.* The normal glow plug consumption is as high as 8 watts 4 amps. at 2 volts. Never more than two volts must be used. Some American plugs will not even stand the two volts. In these cases a two volt accumulator can be used if a resistance of 1/8 ohm. at 4 amps. is placed in circuit. However most modellers will be using British manufactured plugs and all these at the moment can stand up to 2 volts. The most suitable accumulator is the two volt "wireless" battery of 4·5 amps. This can be kept trickle charged at home from the electric light current or a radio shop will recharge as necessary. The British made McCoy plug stipulates a *small* two volt accumulator.

Heavy duty flexible leads are best with crocodile clips that easily permit clipping one lead to the plug and the other to "earth" anywhere on the motor frame. If the motor hesitates on starting, touch the plug for a moment with the lead, but take away as soon as the engine gets firing properly. The current is a low tension one and will not give the modeller a shock like high tension spark may do if the spark plug is inadvertently touched.

Why the Glow Plug Engine Must Have High R.P.M.

In the case of the spark ignition petrol engine, the designer times his spark to occur either late or early in relation to where the piston is situated near the top of its stroke. Thus if the spark ignites the gas just before the piston comes to the top of the power stroke (known as top dead centre) the engine will run fast at high r.p.m., but if it is timed to take place after the



The new "Frog 160 Red Glow" glow plug motor is at present the smallest British specially designed glow plug engine. It permits a small control line model to do any stunt in the book, due to high r.p.m. and performance which keep the lines rod tight. Note the engine so mounted on its side, and the fuel line which is taken one turn around the conical tank

piston has passed the top of its power stroke the ignited gases will obviously give a belated push and the engine runs slowly. As the time of ignition within limits can be altered by the operator through a lever we have an engine that has a reasonably flexible speed range.

The glow plug engine on the other hand has its plug ready glowing, so that as the piston comes up onto the compression stroke, as soon as the fuel and air mixture in the form of explosive gas is ready to ignite it "explodes" and drives the piston down. This may be called early ignition which makes for fast work and a high revving engine. Furthermore the ignition cannot be altered by the operator. It cannot be "retarded" for slower running. That is why at the beginning of this article I emphasised that high r.p.m. is necessary for a glow plug motor. Modellers will find that this early ignition is like starting up a petrol spark ignition engine with ignition fully advanced. There is a tendency to kick back, and a specially smart swing must be given allied to a heavyish propeller to give best results and a reasonable flywheel effect.

The only speed control that the designer can exert over the glow plug engine is to use a suitable compression ratio *with a fuel that does not burn too fast*, for as most readers will know fuels burn rapidly or more slowly according to their composition. The fuel is therefore balanced with the compression ratio. That is why the high compression glow plug engine usually uses an alcohol fuel because it is an anti-detonator which stops the "anvil chorus" of knocking. See my remarks about alcohol under fuels below.

Essentials of Hot Point Ignition—Will My Petrol Engine Run on a Glow Plug?

> "For successful glow plug operation it is necessary to accomplish a very definite and careful balance between the heat of the plug, the type of the fuel used and the compression ratio."

Wise words these, made by the American firm of Ohlsson and Rice, makers of the well-known Ohlsson engines. They precisely sum up why some combinations of plug, fuel and petrol engines do not work when a modeller puts any odd plug into his ancient low compression petrol motor. On the other hand there are many petrol motors that run very well *if the right plug and fuel is used to suit their compression ratio.* For instance, my last year's Ohlsson 23 and 60 petrol engines and the Majesco 4·5 c.c. petrol motor all run very well when a long reach McCoy British-made plug is used. Frog fuel or a straight Methanol castor oil mixture work well on these engines. My Arden and Atwood Champion, both higher compression ratio jobs, run best on the K.L.G. Mini-glo plug. So if you want to try out an old petrol engine before you invest in a specially designed glow plug engine, try different plugs should the first attempt fail, but be sure that your failure to start is not due to that foolish habit people have of using a bell battery for starting. It lasts such a short time that only a millionaire or a cabinet minister can afford renewal expenses.

We may therefore sum up the essentials of hot point ignition as :—(1) a special fuel; (2) a suitable compression ratio; (3) a plug to suit the compression ratio and running temperature; (4) cylinder head design which prevents "shrouding" of the heater plug; (5) almost all petrol motors will operate by glow plug if they have a fairly high compression ratio, and the correct plug with a methanol fuel is used.

High compression and a glowing plug fire the charge early. Therefore a fuel that will prevent too early burning and detonation is necessary, or the piston will be driven back in the wrong direction or pull up the motor's speed by offering great resistance before the top of stroke is reached as in the case of a diesel being run on too high a compression setting. In other words the fuel must burn with a slight time lag and have anti-knock features. Alcohol is generally used for this purpose, so we will discuss its properties in a moment or two. A high compression ratio is required to cause great heat when the gases are compressed at the top of the stroke. A plug that suits the heat of this compression and the heat of combustion is vital. If the plug is shrouded in a pocket the mixture will not be ignited properly and quickly, nor will it burn at the desired speed regularily. Neither will the element keep sufficiently hot to keep glowing when the engine is running. The engine will then fade away.

To recapitulate, the glow plug engine requires the fuel to be balanced with the high compression ratio, and then we are limited to one type of performance, namely flat-out speed at high r.p.m., which we must encourage by fitting a propeller that permits high revolutions.

Fuels for Glow Plug Engines.

Alcohol is less subject to knocking because of a higher resistance to pre-ignition than petroleum in a spark or glow plug engine. It is a suitable fuel for compression ratios between about 7 to 18 to 1. Alcohol fuels are known as cool fuels, and cooling fins can be smaller when it is used.

Methanol fuels contain a major percentage of this light, volatile inflammable fuel. Methanol is derived from a distillation of wood. Methanol is suitable for engines having a compression ratio ranging from 7 to 14 to 1 (dirt track motor cycles have about 14 to 1). This fuel keeps engine temperatures moderate. Whereas it takes about 15½ parts of air by volume to burn one part petrol efficiently; it requires 8½ parts by volume of air to burn one part of alcohol. Alcohol fuels therefore have a higher consumption than straight petrol. That is why we require larger tanks and needle valve openings on glow plug engines.

To be concluded next month.

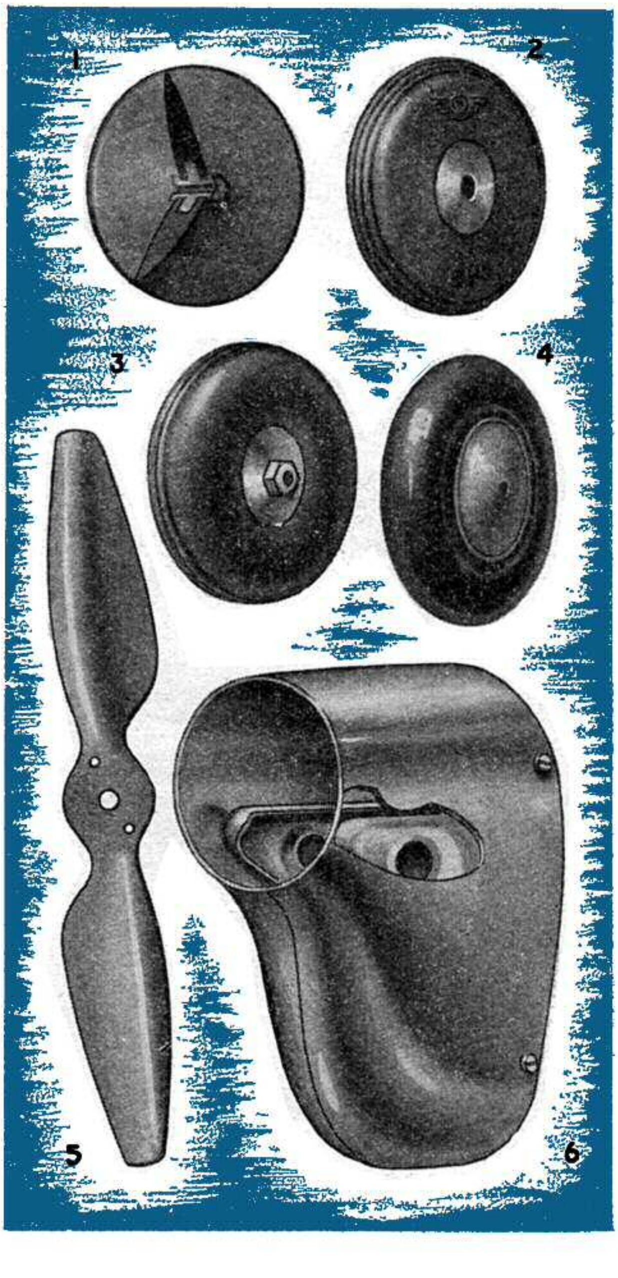
MORE CONTROL LINES

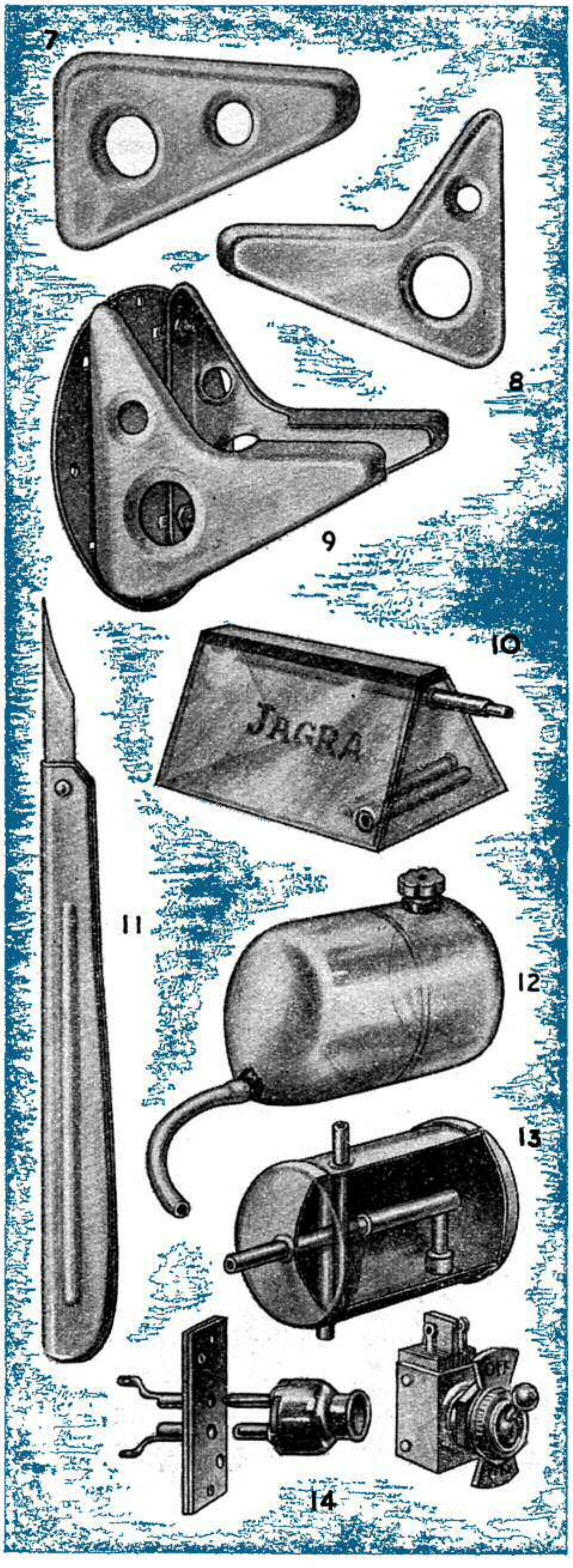
HERE is the second of our promised series of Control Line Trade Reviews. We are glad to review this month the products of several new firms as well as those of the more well known model establishments who regularly send us their new items as they produce them. We extend an invitation to all manufacturers to send us, for frank review after practical test, any or all of their products having any bearing on control line. Later we hope to extend these trade reviews to cover all branches of aeromodelling, and to feature a complete engine review backed up with results obtained on a new Dynamic Thrust Recorder shortly to be in operation in the Research Department. Whilst we review everything sent us, we have no intention of reviewing any goods on the market *unless* they are sent us for that purpose by the manufacturers concerned.

We have again received quite a selection of wheels all of which we have tested with good results. " Airline " by MANX MODEL Co., solid rubber thin streamline section of 2 in. diameter, are the standard pattern control line wheel and well up to normal high speed requirements (1). Dural hubs of the same anti-pull-off section are soon to replace the present brass variety fitted. Price is 3/- a pair. MODEL SHOP (NEWCASTLE) have produced a variety of excellent wheels, both pneumatic and solid. 1¾ in. solid control line type (2) are some of the best we have seen—a unique feature being the treaded circumference which apart from enhancing the appearance increases their efficiency. With deep anti-pull off hubs, well worth the 3/6. We have examined two other wheels from this firm—one the fully pneumatic 2 in. airwheel, and the other the baby semi-pneumatic 1¾ in. (3). Both of these are very nice treaded wheels, light in weight and reasonable in price. The hubs are strong if a little untidy. Price 8/6 the 2 in., 7/- the 1¾ in. and the wheels fulfil a long felt want. We hope to see even smaller specimens in the future after the American style. Last selection of wheels comes from J'S MODEL CENTRE who have a new line in their Slipstream " Aircord " plastic wheels with moulded rubbery plastic semi-pneumatic tyres (4) a kind of baby airwheel for rubber models and light power or control line machines—a revolutionary improvement. They are stronger and lighter than most ordinary celluloid wheels and are available in three sizes in a variety of attractive colour combinations. The tyres do not tear off easily and the resilient plastic surface gives an excellent degree of grip. The hubs in the larger sizes are being strengthened to stand 10 and 12 s.w.g. drilling. Prices 1¾ in. 2/6 pair, 1½ in. 1/7 pair, 1¼ in. 1/3 pair, 1 in. 1/- pair.

We have received only one sample airscrew for review (5) and this is unique in that it is of pressed metal instead of the usual wood. Made by VICTORY INDUSTRIES LTD., these airscrews are drilled to fit the Mills but will suit any engine of similar capacity. They are obtainable in red, green or blue cellulose finish at 1/6 or in polished metal at 2/-. They bend on impact but unless it is very severe they bend straight back again quite easily. Despite one's fears for one's fingers they caused no damage on test, starting just as easily as a wooden prop, giving good thrust and slightly increased revs. and their life is definitely longer. Their use of course, is not allowed in contests but they certainly help out prop costs in control line training.

Our other items this month are a complete miscellany starting with a series of light metal pressings from MAGNA PRODUCTS. Modellers without the facilities or training for light metal shaping who would like to use fully cowled engines of scalish appearance can now do so at quite reasonable prices. Magna Products market a fully complete engine unit of bulkhead, bearers and cowling with one side hinged to lift. The size illustrated (6) for 2-6 c.c. motors costs 12/6 which is in no way an exorbitant price. Another product of this firm is pressed engine mounts which are *really* firm metal mounts at last. We can truthfully say these are the best we have examined to date. They are 100% rigid—indeed they are almost impossible to twist in the fingers. They are available in three sizes, type I (light) 1/3 (7), types II and III (medium and heavy) 2/6 (8), to suit all but the heaviest of engines, and there is also an engine bearer and back plate unit at 2/9 (9). This however suffers from the disadvantage that the circular back plate allows only a very small space between the bearers, and although they are heavy type





bearers it will not accommodate other than the small size engines. One other product of this company is a very reasonably priced balsa knife of the scalpel type which is priced at 1/– and is a most useful tool (11). The blade will stand up to a lot of reasonable treatment, although it is obviously not for heavy work. The blades are not replaceable but can quite easily be resharpened. With careful use their life is perfectly satisfactory.

We present an interesting range of stunt tanks this month starting with the Jagra Visiflo stunt tank (10) price 5/– made by WATKINS STORES, Cardiff. Made from thick acetate sheet it gives constant non-centrifugal feed sufficient for a Mills for up to 15 minutes, and other motors according to capacity. It gives untroubled running for any motor with ordinary fuels. The success of J'S MODEL CENTRE'S first " Slipstream " tank has resulted in two further sizes now being manufactured. Size three illustrated (12) is the largest with a capacity of four times that of the small tank. This gives forced feed by centrifugal force in any flight position and like the earlier tank is perfectly satisfactory. It is priced at 6/6 and the intermediate size (19) just on the market at time of writing is 6/–. Both these tanks have the advantage of being transparent but as a result are not hot fuel proof.

SHAW'S MODEL AIRCRAFT SUPPLIES have produced a new Precision " Eeziflo " stunt tank (13). This is of the new and increasingly popular cylindrical shape, is hot fuel proof with a dull nickel finish, and can be obtained in two sizes for large and small motors price 7/– and 6/– respectively. Feed is non-centrifugal, constant and uninterrupted by virtue of the unique swinging weighted fuel pipe which literally stays with the fuel wherever it goes. The tank is rather heavier than is sometimes desirable but it is very strong and well finished, and completely solves the fuel problem in a most ingenious manner.

Our remaining articles for review are very mixed. HENRY J. NICHOLLS sent us his " Mercury " Booster plug and socket (14), a neat attachment which will prove of help to the petrol enthusiasts. The neat paxolin socket is fitted flush with the surface of the model and the two-pin plug has the two pins of different sizes to prevent any possibility of wrong insertion. The whole unit is neat and effective and reasonably priced at 1/6. Also marketed is a small but neat switch (14) which again calls for no adverse comment, price 2/6.

J'S MODEL CENTRE have a development of their Craftsman Planer, which can now be obtained incorporating a very neat little balsa stripping device (15). This is not expensive and therefore not a "precision" machine, but it is simple and reasonably accurate to use, a boon when you've run out of the right size strip at the week end. Spare blades are available at 9d. a dozen, the whole being excellent value at 5/11.

New lines on the market are MANX MODEL CO'S " Airlines " which are an innovation in that they are of annealed rustless steel wire. They will thus stretch to a fair degree and kinks can be worked out by stretching both lines together, and lines can be evened up by stretching separately. There is no tendency to stretch in flight, however. The wire definitely has less tendency to snap than ordinary wire, and loops needs not be soldered as they will not pull out. They are recommended for models up to 3 c.c. but we have flown all sizes of models on them without trouble. This firm also supplies a most useful accessory in 6 BA Simmonds Lock Nuts for engine fixing, 6d. per packet of four. These cannot vibrate loose—something dieselmen will appreciate.

DON MODELS supply a handy new type of engine fixing U bolts (16) for E.D. or Mills which save the trouble of soldering a tie bar on buried engine bolts. They retail at 9d. per pair, packeted complete with washers and double nuts. From SHAW'S MODEL AIRCRAFT SUPPLIES comes a generous sample of their "Marjonos" (Uncle Oswald's) Hot Fuel Proofer, which is available in a 2/9 size and a 7/6 size, latter being four times the cheaper size. It is obtainable in clear, red, black, blue and yellow, is quite impervious to hot fuels and is economical as only one coat is necessary for proofing. It arrives complete with hardener and thinners, dries hard in four hours and gives a very high glossy finish.

We found that it gives complete protection to all parts of the model covered and is simple and easy to use. Also from SHAW'S is the " Snip " speed chart (17) designed by Ron Warring which is a pocket celluloid calculator for control line speed timing, giving speeds over any number of laps with any line length. It makes a very handy reference guide for control line addicts as well as for competition judges.

For the scale model fan, WATKIN'S STORES are selling pressed aluminium wheel discs of various sizes (22) at 2/6 per pair which are useful for giving a scale appearance to ordinary balloon or home made wheels. Glow plug enthusiasts will greet with joy the new 2 volt accumulator of the R.A.F. type marketed by the Model Shop, Newcastle, which stands up well to the heavy drain of glow plug operation, long outlasting ordinary batteries which become dead with alarming rapidity. At its price of 6/– it is not an uneconomical proposition as it can be recharged very cheaply whenever required. All control line fans will appreciate another Model Shop accessory in their plastic wheel clips which finally solve wheel shedding troubles, and unenjoyable soldering which is liable to failure. These clips as illustrated (18), are obtainable in sizes to fit 16, 14, and 12 gauge wire at 5d. a pair and at 6d. a pair for 10 gauge. They are handsome small streamlined devices in plastic with a spring steel lining which effectively grips the undercarriage wire with no fear of becoming detached although they screw fit on with very little effort. At the price they are a definite investment for any power model whether control line or free flight and in the 16 gauge size will be found most useful for rubber models as well. It is also not difficult to visualise other beneficial uses of these invaluable little items.

Plastic mouldings are seeing increasing use in model aircraft accessories and another item from MODEL SHOP, Newcastle is a moulded plastic cowling to fit a Mills (21). This is a most attractive article of great usefulness. Accessibility is left to the ingenuity of the builder, it being possible to cut the cowling in any desired way. At 6/6 this unit will fulfil an urgent need for both control line and free flight. We understand that similar cowls will be available for other popular engines.

We come now to a brief selection of control line kits which show a marked increase in general quality on the whole. We have noted that wood is generally better selected, better cut, and in particular plans appear to be better drawn.

***** RIVAL. Don Models. 22 in. span trainer stunter. This little kit was prepared with our remarks of the first trade review in mind and a very acceptable little kit it is. At 10/6 it gives you one of the best values we have seen and despite the fact that fewer parts are ready cut there is no arduous work entailed. The wood is good " Solarbo " balsa, practically everything with the exception of wheels is included in the kit and the model builds up into a very nice little job which with a Mills is one of the most stable models we have flown and makes an ideal trainer. With larger engine and/or increased elevators the model will stunt. Full marks.

**** NIEUPORT 17C. Modelair Control Liners. 20½ in. span sport scale model. A good kit with accurately cut wood of good quality. Fully complete instructions and a fairly detailed plan prevent any difficulties in construction. Price is 19/6 but the kit is well appointed with such items as preformed undercarriage etc.

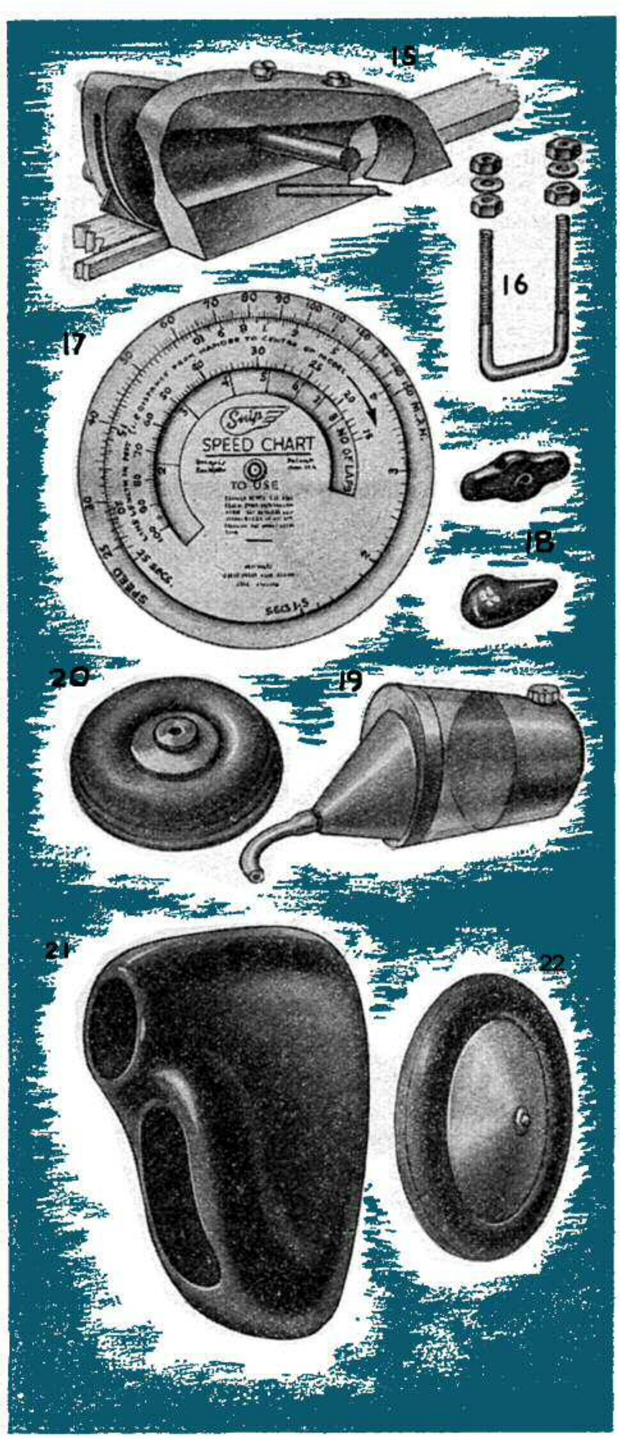
*** MEW GULL. Modelair Control Liners. 24 in. span sport semi-scale model. Criticism as for Nieuport. Price is 35/–, rather expensive, but a very complete kit with generous wastage allowance.

**** SABRE. Halfax Models Ltd. 18 in. span advanced trainer-speedster. This kit is a great improvement on the earlier " Trainer " and is very well prepared and good value for money. " Solarbo " balsa is used, wire parts are sensibly stout. It makes up into an elegant advanced trainer or speed model. Price is 16/6.

***** RADIUS. International Model Aircraft Ltd., (Frog). 22 in. span sport model. First class kit of a simple sport model with many preformed parts including semi-monocoque fuselage. The kit has obviously had painstaking preparation and is complete even to control lines and handle. Price 17/6.

**** THUNDERBIRD. British Model Aircraft (Skyleada). 29 in. span stunter. This kit has a very clear plan, and the finest wood seen in any kit. Some of it was so hard it could only be sawn. There is plenty of material but it is without small accessories such as nuts and bolts etc., although an excellent pair of rubber wheels are included. Price is 22/6.

***** NANCY SEAPLANE. J's Model Centre. 18 in. span trainer sportster seaplane. Again the same high quality

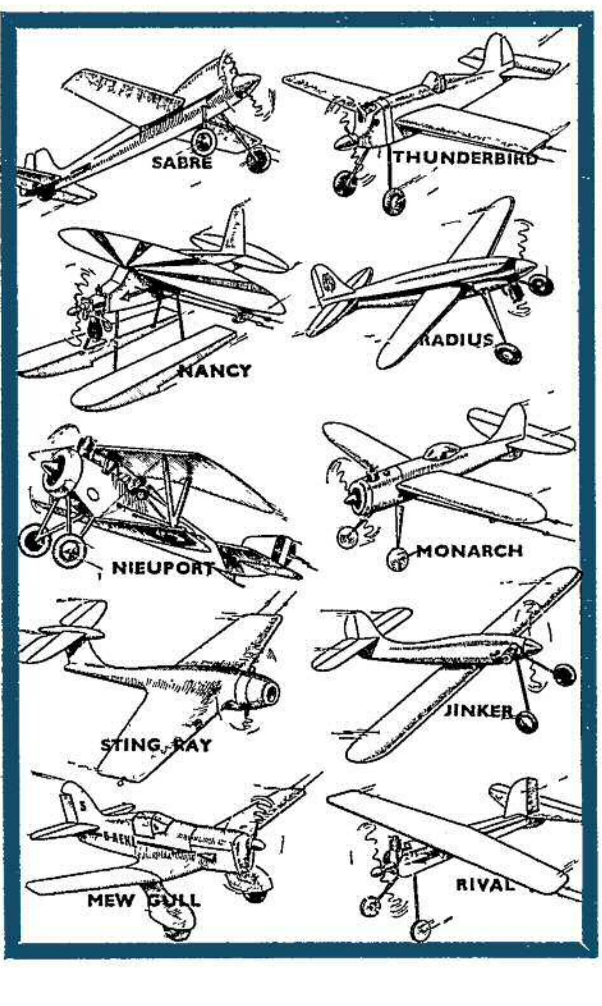


as in the original "Nancy" kit, with the addition of ready cut float assembly. Wood is, if anything, slightly better than before. Makes a most docile small capacity engine trainer or a fairly lively sportster with more powerful engines. Price is 18/6.

**** MONARCH. Worcraft Products Ltd., 26¼ in. span sport speedster. A very complete kit at the price asked with rubber wheels and other refinements. Owners of one engine only will probably wish to change the engine and cowling arrangements as once the engine is fitted in place, it cannot be removed without cutting away the cowling. Price 17/6.

***** CESSNA "AIRMASTER", Modelair Control Liners, 25 in. span scale model. This, the latest of the new Modelair range, is a very good kit indeed. Everything is supplied even down to tubing for connecting tank to engine. It can be supplied as a landplane-skiplane at 17/6, a floatplane at 21/6 or a de-luxe combined version at 22/–. A conversion kit from landplane to seaplane is also obtainable price 5/6, complete with cement and accessories. The wood is excellent, though one or two parts could be rather more accurately cut. A very good kit.

Once again we have a couple of plans from WATKIN'S STORES, tried and tested designs from their control line stable. One is the "Jinker", an attractive little stunter of 30 in. span of simple but rugged construction for the Mills. Plan price is 2/9. The other is a Mills speed model of advanced design the "Sting Ray" 15 in. span, capable of speeds above the 60 m.p.h. mark. Plan price 4/3. Both these plans are very well drawn, the latter up to the highest standard of model aeronautical draughtsmanship.



TOPICAL TECHNICS

or the PRACTICAL MAN'S REPLY!

Illustrations on Page V of Cover.

To all who grapple hopelessly with graph paper amidst the jeers of the formuleers, to all who like Fliar Phil are wishing to make aeromodelling more serious, to all who wish to banish unseemly laughter from club-house and workshop, and to clothe the flying field in the pregnant gloom of concentrated thought, he dedicates this article. (No funny hats or remarks, please.)

Fliar Phil, having caused an insurrection in the Editorial Office this month and rendered Consus temporarily unconsus[1], takes his readers' interests to heart as always and produces his own helpful page this month; rejecting, however, not a single idea sent in with the exception of those from readers. Collated by the brains[2] of the Aeromodeller staff, they are based on the recent discovery by "technical" investigators that the Wakefield winner could still have flown had it been designed by one of them—a singular omission due only to pressure of work or water or something.

GRAPHS ARE GLORIOUS. First comes a brilliant idea which may revolutionise record flying for waterplanes. Everyone knows that as soon as a seaplane is placed upon water it sinks. To overcome this all that is needed is a couple of bottles of liquid air (bought from any greengrocers) which can be poured gently out at a suitable height from the ground, when the machine can be safely hand-launched.

ARE WIND TUNNELS HOT AIR ? ASKS WILLY. Now a device of proved worth for whose original conception we owe the letter of a technically-minded reader who informed us the great thing about his design was the swept forward wing which stopped the Centre of Pressure moving forward right off the edge of the wing. But, my poppets, this is not enough. An unusually energetic Centre of Pressure will not be put off by mere distance. After all, transport is nationalised. Low cunning is necessary to entrap the wily beast. The solution is finally provided here, absolutely for nothing. So you are using a thick section wing? We smell[3] violent Centre of Pressure movement. Before we know it, he'll be off, but not with this new system. Use this ingenious device and *trap him!* Slot the leading edge upper surface spanwise about ½ in. behind the L.E. spar, and lead the slot to about the same position at the trailing edge upper surface. Narrow the exit slightly and we have a venturi airway. Now talk gently about the weather to soothe the C.P.'s suspicions, while greasing the upper surface of the wing from the slot back to the maximum camber. Fly the model[4] and watch. Ah, there goes the C.P., crafty little wretch, sneaking up the profile to the maximum camber. Watch him peep over the top and seeing it all clear he charges. Here's the fun—he slips on the greasy slide straight down the slot, and air pressure blows him back, through, and out at the trailing edge. Nothing daunted, he will try again with the same result, but after several trips in this manner the C.P. will become miserable and dispirited and go quietly to sleep halfway down the trailing edge slope where he is out of the draught. As a result the model becomes completely stable and all trouble is ended[5].

CALCULATIONS MAKE IT CLEARER. Fliar Phil's own Research Department presents his Aeromodeller hat—this does away with all the trouble modellers often experience on the flying field as no useful accessory is left behind. As a matter of fact if you are a strong man and you get wrinkles in your tissue, even the kitchen mangle can be fitted at some point on its carefully designed surface. A small spirit stove is incorporated to provide thermals and for making hot fuel on the flying field. Pockets are fitted for assorted tubes of downthrust and incidence. An aeromodeller's ingenious makeshift, a converted cocktail shaker, is for mixing cement. The brim is of flannel, 5 ft. long, and combined with that of a similarly well-dressed helper, gives complete protection to the rubber when stretch-winding in the sun. It is saturated with lubricant which can be squirted to any desired point by squeezing the crown, though single drops are best administered by a violent twitch of the ears.

DICK BARTON SAYS: "FORMULÆ FOR ME!" The great trouble with contra prop units, of course, is the strong tendency each airscrew has to turn in the opposite direction to the other, thus upsetting the Boundary Layer and all the wireless sets in the district. In our new unit this is entirely overcome as both airscrews are locked together with nuts and bolts, and the fuselage alone revolves. It is, however, difficult to reverse, but helps better covering of the tailplane.

ANYFIN WON'T DO! A recent engine development comes from the workshops and is now published for the first[6] time. The trend towards visible working has always met with our approval, helping as it does to trace elusive faults. However, the suggestion so commonly made regarding the use of celluloid cylinders can hardly be seriously entertained. Instead, and so simple one wonders why no-one ever thought of it before, is the system of snap-on cylinder head fixing. This prevents the time lag and great inconvenience of removing the head in the normal way. The head is firmly fixed by four press-studs so that should those clanking noises commence the head can be quickly whipped off by the thumb-nail, the engine inspected, the trouble removed, and head replaced all without even stopping the engine, let alone taking it to pieces. As we have said—too simple, isn't it?

TURBULENT FLO CELEBRATES JUBILEE. Turn now to Fig. 24 which, being self-explanatory, technical types will be unable to understand. Now turn back again.

I OWE MY STRENGTH TO NOMOGRAMS. Here is an S.O.S. from Assistant Editor H. G. Hundleby. Will people please refrain from writing for plans of his "Kipper" Control-liner, as none exist. He built it out of his own head[7] but the original may be inspected at any branch of Mac Fisheries.

AEROMOD SAVED BY SIN. The remaining fourteen pages of this treatise will be given up to the investigation of technical devices such as a viscosity machine for finding the number of slugs per cubic foot of cabbage, the effects of square wheels for assisted take-off, and a new type of control-line reel handle of 2,000 yds. capacity for o.o.s. flights. Taking the last first, this consists of two bicycle wheels which are fitted to a bicycle, the whole being held in the left hand in an upright position which the helper helps by holding up the[8]

1. *It gets worse than this.* [Ed.] 2. *?* [Ed.] 3. *You're telling us.* [Ed.]
4. *Yes, go on, try!* [Ed.] 5. *Must be the neutral point.* [Ed.] 6. *And last.* [Ed.]
7. *We could make a crack here* [Ed.] 8. *You've had it chum, it won't go in. Thank goodness for that.* [Ed.]

W. Musciano's Control Line FOKKER TRIPE

ONE of the most enjoyable and interesting phases of control line flying is the operation of exact scale replicas. Before the advent of control flying those modellers interested in flying scale models had a very limited selection of full scale aircraft that would fly successfully and still adhere to exact dihedral and stabiliser dimensions, etc. Triplanes were, by far, the most difficult to adjust and fly.

The "Fokker" Triplane presented herewith has proved very successful as a one-inch to the foot scale control line flyer. There has been no deviation from the true scale and the model has won several flying scale contests. Construction is quite conventional and is ideally suited for the beginner and yet will please the experts with its rakish appearance and excellent manœuvrability. Small diesels as well as glo-plug operated engines from ·099 to ·19 cubic inch displacement have been successfully used. A Bantam with a McCoy "Hot Point" glo-plug is shown in the photos.

Werner Voss, Ernst Udet, Herman Goering and Manfred von Richthofen along with many other Aces praised the excellent manœuvrability of Tony Fokker's little triplane, and you too will be quick to recommend the model to your friends.

It is advisable to begin construction with the fuselage. The fuselage is of typical side frame construction with a 3/16 inch sheet balsa forward portion. Two side frames are constructed by pinning the 3/16 inch square on the work table directly over the plan. When the 3/16 inch sheet is cut, a space must be allowed to insert the lower wing. The engine mount is now cut out and cemented firmly between the side frames. This mount must be cut to fit the engine to be used. Soft balsa is used for the fuselage top and this unit is installed later. Now the aftermost points of the fuselage are cemented together and the stabilizer and elevator added after they have been cut from 1/8 inch sheet and sanded to a streamline shape. The bellcrank is bolted to the engine mount and the aluminium tube control rod connected in place.

Before the fuselage can be completed the wings must be finished. They are of sparless design and the load is taken by the heavy leading and trailing edge. The leading edge can be made in one piece in view of the fact that no dihedral is required. All three wings are made in one piece. Silkspan (heavy) was used for covering with three coats of clear dope with fine sandings between coats. The centre and lower wings can be cemented to the fuselage at this time together with the lower braces and fuselage top. While this is drying the landing gear can be bent from 1/16 inch diameter music wire.

When the wire struts and axle have been joined together the assembly can be attached to the plane. Using strong thread wrap the forward strut to the hardwood cross piece and the rear strut to the lower wing leading edge. Smear these joints with plenty of cement and cover the nose bottom with 1/8 inch sheet balsa. Carve the cowl from soft balsa and cement in place. The 1/8 inch stringers are cemented in place and filled in with 1/8 inch soft sheet balsa and sanded smooth. The rest of the fuselage is silkspan covered.

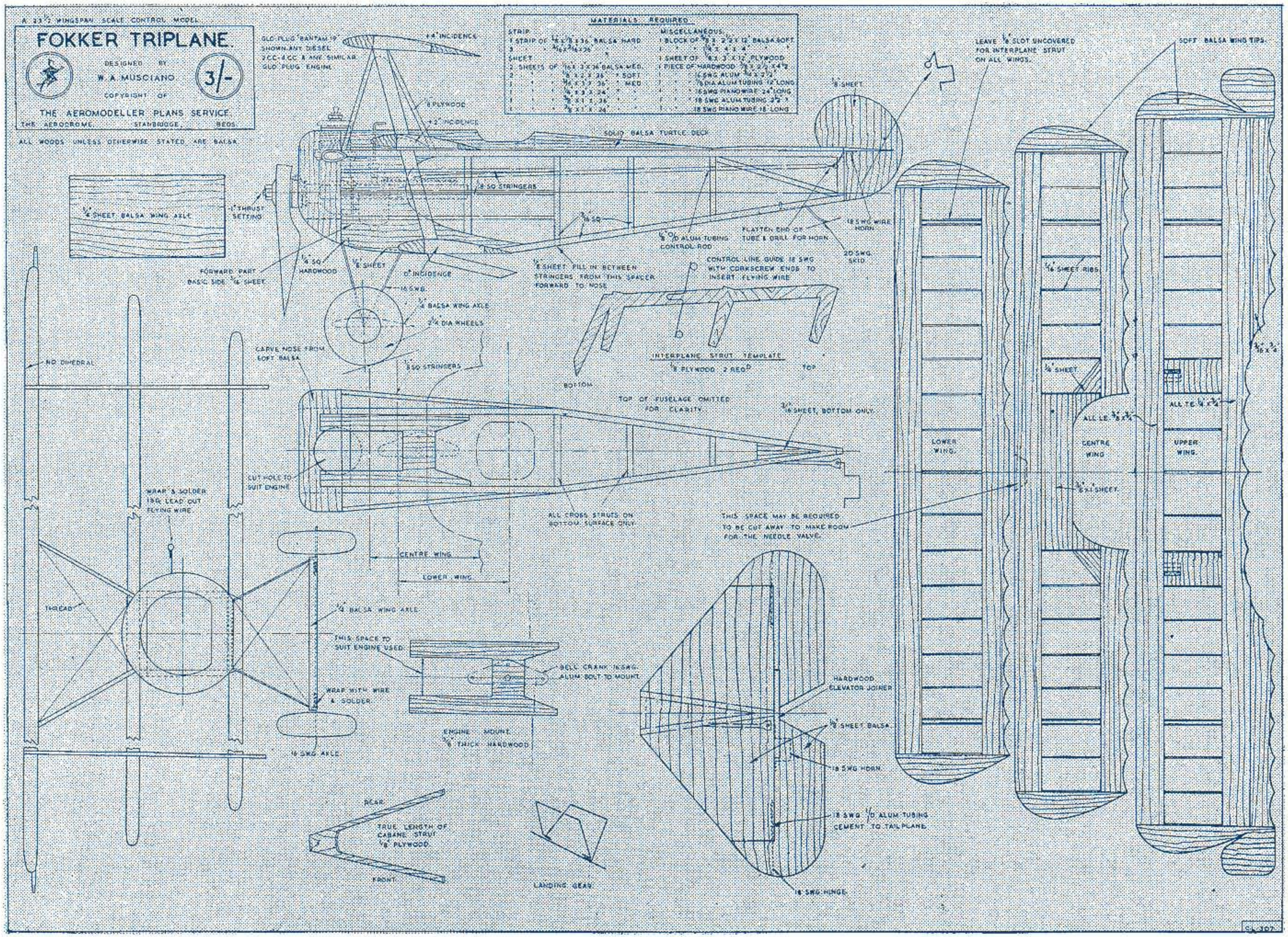
The interplane and cabane struts are cut from 1/8 inch plywood, two of each are required. Note that only the port side (left looking forward) strut has a control line guide. The struts are sanded to a streamline shape and cemented firmly in place. The interplane struts are inserted in the slots provided for them in the wings. Now it is a simple matter to attach the upper wing. The interplane struts automatically set the wings at a correct incidence angle. The addition of the rudder completes the model.

Assuming the model has had three coats of clear dope we are now ready for the colour. The model photographed was painted all red with black crosses on white fields. The rudder is white with a black cross. This scheme was used on Baron von Richthofen's ship. Four coats of a good quality dope should produce a fine finish. A careful application of rubbing compound and a coat of wax will enhance the beauty of any airplane.

Although the original model balanced perfectly when powered with a Bantam, the builder may find it necessary to add weight in order to balance the model correctly. The balance point should be 3/8 inch behind the forward control wire. Stainless steel stranded ·008 inch diameter wire was used in flying the "Tripe". Because of its light weight the model could be flown on strong waxed fish line, although this is not recommended. Lines from twenty to forty feet long have been used. The short lines are suggested for windy weather. Offset the rudder slightly in order to cause the model to tend to fly away from the centre of the circle thereby maintaining tension on the lines. If at any time the lines do become slack, quickly take a step or two to the rear until control of the model is restored. Take-off should begin down wind and it will be found that the model is quick to leave the ground. When the power cuts out the model settles to the ground gently because of its low wing loading. If such stunts as inverted flight or outside loops are to be attempted it is suggested that a triangular sectioned constant feed tank be fitted as well as a symmetrical airfoil such as the N.A.C.A., ·0016 be used. The model as shown will perform inside loops and various other non-competition stunts with ease and if built with care is a certain concours winner.

Full sized plans of this intriguing scale control-liner may be obtained for 3/- post free from Aeromodeller Plans Service, The Aerodrome, Billington Road, Stanbridge, Nr. Leighton Buzzard. The illustration opposite is one quarter actual size.

(Are Triplanes coming into Control-line fashion? We note with interest that our French contemporary Model Reduit d'Avion *has recently featured a control-line model of the equally famous Sopwith Triplane.*—Ed.)



A 23½" WINGSPAN SCALE CONTROL MODEL
FOKKER TRIPLANE.
DESIGNED BY
W. A. MUSCIANO
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE.
THE AERODROME, STANBRIDGE, BEDS.
3/-
ALL WOODS UNLESS OTHERWISE STATED ARE BALSA
MATERIALS REQUIRED
STRIP
SHEET
MISCELLANEOUS.
SOLID BALSA TURTLE DECK
¼" SHEET BALSA WING AXLE
FORWARD PART BASIC SIDE 1/16" SHEET.
CARVE NOSE FROM SOFT BALSA
CUT HOLE TO SUIT ENGINE
NO DIHEDRAL
THREAD
TOP OF FUSELAGE OMITTED FOR CLARITY.
ALL CROSS STRUTS ON BOTTOM SURFACE ONLY.
INTERPLANE STRUT TEMPLATE
BOTTOM
TOP
CENTRE WING
LOWER WING
THIS SPACE TO SUIT ENGINE USED.
ENGINE MOUNT
LANDING GEAR
FRONT
REAR
TRUE LENGTH OF CABANE STRUT
HARDWOOD ELEVATOR JOINER
16 SWG HINGE.
THIS SPACE MAY BE REQUIRED TO BE CUT AWAY TO MAKE ROOM FOR THE NEEDLE VALVE.
LEAVE ⅛" SLOT UNCOVERED FOR INTERPLANE STRUT ON ALL WINGS.
SOFT BALSA WING TIPS.
LOWER WING
CENTRE WING
UPPER WING

H.J.N. Greets Modellers with his Xmas Bulletin AND EASY REFERENCE LIST No. 3

Two years of experience in meeting aeromodellers' requirements has shown us that the first essential is to keep them right up-to-date with information about the latest lines offered by manufacturers. To do this we adopted our easy reference lists. The success they have achieved, and their popularity with modellers has shown that these lists are now universally preferred to a catalogue that must necessarily become dated.

For Chrismas 1948 we have produced a super issue of our Easy Reference List number 3, combined with H.J.N.'s first Christmas Bulletin, and in this modellers will find that all their requirements for the festive season will be adequately met.

Fill in and send the coupon below without delay for your copy of the best " gen " sheet for aeromodellers ever produced.

SEND FOR FREE COPY NOW

1948 has seen Control-line firmly established. Next year, a lot of modellers will go all out for Radio-Control. As modellers ourselves we shall always be to the fore in encouraging new worth-while ideas, and we look forward to another exhilarating year of flying. The staff join me in wishing a Merry Christmas to modellers everywhere, with happy landings for 1949.

Henry J. Nicholls.

Greetings to Customers in

Abyssinia
Aden
Algeria
Argentina
Australia
B.A.O.R.
Belgium
Bermuda
Brazil
Brit. Guiana
Brit. Honduras
Brit. Somaliland
Burma
Canada
Ceylon
Chile
Cyprus
Denmark
Eire
France
Gibraltar
Gold Coast
Iraq
Holland
Hong Kong
India
Jamaica
Japan (B.C.O.F.)
Kenya
Madagascar
Malta
M.E.F.
Mexico
Morocco
Newfoundland
New Zealand
Nigeria
Nyasaland
Pakistan
Palestine
Rhodesia
Sierra Leone
Seychelles
Shanghai
Sudan
Tanganyika
Trinidad
Uruguay
U.S.A.
Union of S. Africa

PROGRESS . . .

How many remember this quarter page in the Aeromodeller. It appeared in Feb., 1947, and marked the first step in H.J.N.'s career as an enthusiastic model specialist with new ideas of service. That we have gone so far since is the measure of confidence thousands of modellers have in our organisation. It pays to deal with H.J.N.

SERVICE . . .

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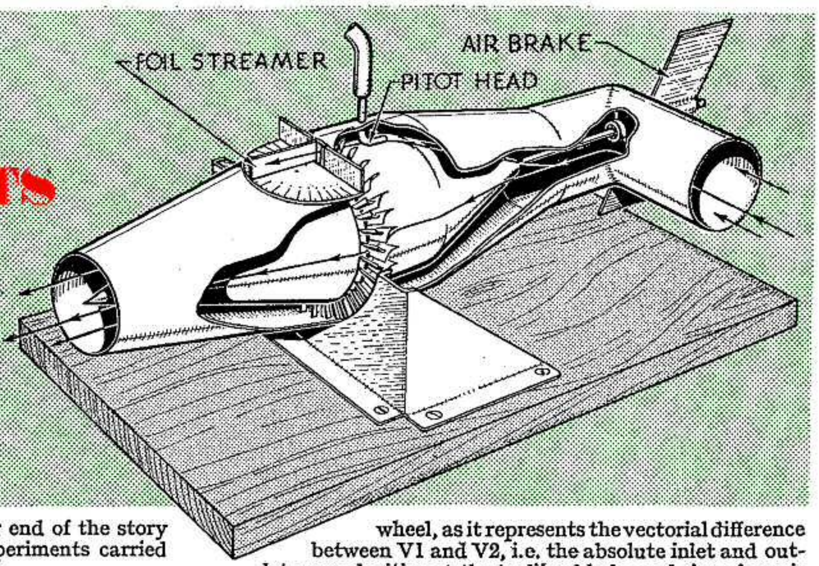
GAS TURBINE EXPERIMENTS

Part Two

BY L. G. CRAMP



LAST month we dealt with the compressor end of the story and a brief account was given of some experiments carried out together with the results obtained.

And now bearing in mind the difficulty of condensing the information on the gas turbine, without making the subject too hazy, a spot of theory is necessary to allow the reader to analyse the experiments made. One of the first steps toward the design of a turbine, is to have some idea of the working conditions under which it is intended to run, and dealing with these in order we have (*a*) the maximum working temperature we can allow, together with the pressure ratio obtainable. This will give us some idea of the velocity of the working fluid (Vl) at the turbine nozzles. (*b*) The maximum rotational speed desirable. Having arrived at this decision we may go one step further and investigate in diagrammatic form, just what happens when the turbine is running. In order to do this we must construct the diagram of velocities, which may be set out to any convenient scale as shown in the illustration Fig. 1. Let AB represent the peripheral speed (U) in magnitude and direction of the turbine wheel, at mean blade diameter. Let CB represent the jet speed (V1) at the turbine stator blades (or nozzles) in magnitude and direction, the angle (œ) is the angle made by the jet with the plane of the wheel. CA then represents the jet (V1R) in magnitude and direction relative to the moving blade of the turbine wheel. Therefore the angle (œ) is the actual entrance angle at which the jet stream enters the turbine, and is therefore the leading edge angle of the blade.

Let angle (*B*) be that which is made by the exit gases to the plane of ratio of the wheel, then DE represents the exit gases (V2R) in magnitude and direction relative to the moving blade, and DF represents to the same scale (V2) the absolute velocity and direction of the gas stream relative to the turbine casing, due of course to the component EF which is equal to (U) the wheel speed (AB). Now if we redraw the components BC and AC in the position shown by the dotted lines, we shall be able to read off to the same scale the quantity HG which is known as the velocity of whirl (Vw) and one of the factors which will enable us to calculate the thrust on the turbine wheel, as it represents the vectorial difference between V1 and V2, i.e. the absolute inlet and outlet gas velocities at the turbine blade, and since force is proportional to the rate of change of momentum, then the force exerted on the blade in the direction AB by the jet is

$$F=\frac{WHG}{g}\quad =F=\frac{W\,Vw}{g}$$

where W is the weight of gas per second passing over the the blade and g the acceleration force, gravity. This then is the tangential thrust on the turbine blades and it will be observed that this is not as much as the total thrust which is:—

$$F=\frac{W\,FG}{g}$$

due to the fact that there is an axial thrust represented by the component FH, which can be regarded as a loss.

Now the next thing we want to know is a measure of the efficiency of the turbine blade, which is equal to the ratio

$$\frac{\text{the useful energy harnessed by the blades}}{\text{kinetic energy of the nozzle jets.}}$$

Now the kinetic energy of the jet equals :—

$$\frac{W\,V1/_1{}^2}{2g}\text{ ft. lb. per sec.}$$

and the quantity if useful energy harnessed by the blade equals :—

$$\frac{W\,Vw\,U}{2g}\text{ ft. lb. per sec.}$$

$$\therefore\text{ blade efficiency } YB=\frac{W\,VwU}{g}\quad\frac{2g}{WV_1{}^2}\quad=\frac{2U\,Vw}{V_1{}^2}$$

Now if we take ·89 as being the nozzle efficiency (a quite reasonable figure for small nozzles of this type) and multiply it by the blade efficiency, we will then have the turbine stage efficiency i.e. YNYB=Stage Y.

We are now in a position to examine an experiment which was made with a small turbine of 3 ins. mean blade diameter. This was built up of mild steel, the disc (which was of the constant stress type section) was turned up and the periphery slotted to take 30 blades of correct profile.

After being mounted on a true shaft the assembly was balanced and installed into the test rig shown in the illustration. Air delivered from a blower was used to drive the turbine and the delivery pipe and housing were designed so as to prevent a Bernoulli pressure rise, in fact, the cross sectional area from the delivery pipe to the turbine nozzles was slightly decreased so as to increase the airflow velocity.

Now the nozzles in this case were only required to give the airflow the right angle of attack to the turbine blades, and as no expansion would be taking place in them were of a constant cross section and in the test rig shown, these were made up of thin tin plate, and curved through the required angle, which in this case was 42 deg. A small rectangular piece of tin plate was attached to the projecting end of the turbine shaft as an air brake to absorb the power developed.

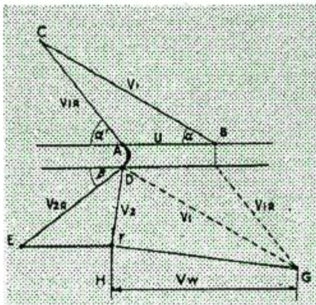


FIG.1.

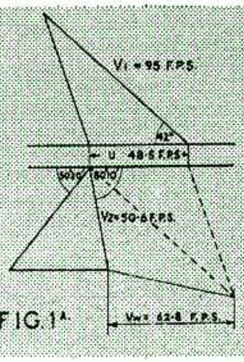


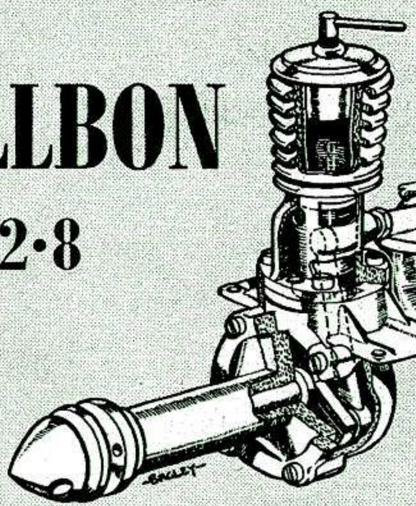
FIG.1A.

(*Continued on page* 39.)

Engine Analysis

NUMBER EIGHT.

The ALLBON 2·8



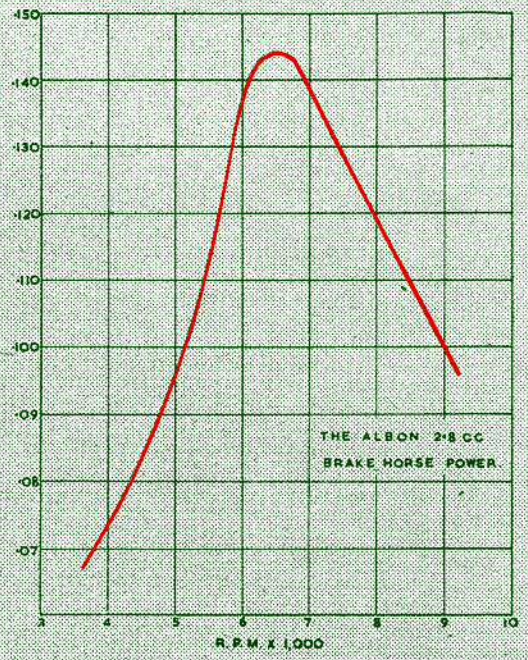
BY LAWRENCE H. SPAREY

MR. Payne and the writer were recently surprised by the L.S.A.R.A. tests on the Mills Mk. II diesel: the maximum b.h.p. was quoted as 0·1 at 10,500 r.p.m. as against the AEROMODELLER figures of ·078 b.h.p. at 7,250 r.p.m. and the static thrust was given as 18 ozs. After a period of testing several examples of each design, it was decided that the variations in performance encountered with identical engines amply explained the conundrum, but at the same time this very forcibly impressed the fact that "Engine Analysis" power curves only applied to the particular engine in the writer's possession.

In order to make this series more generally useful, Mr. Payne has developed a simple torque bar which can best be described as a length of "engine bearer" bolted on in place of a prop. Since it takes only a few minutes to make, any modeller can use it, provided he has in his possession one of the "vibrating reed" rev counters now in such good supply. Using torque bars of several lengths, the b.h.p. of any engine can be quickly found by measuring r.p.m. and using a simple Nomogram. Or more simply, revs obtained with a standard bar, can be compared with the AEROMODELLER figures (which will be an average of several engines) and it can at once be seen whether the engine under test is better or worse than average. The torque bar is at present being calibrated, and it is hoped that full details can be given next month.

TEST

Engine: "Allbon" 2·8 c.c.



Fuel: Maker's recommended.

Starting: Hand starting was used throughout. The engine started most easily on every occasion; in fact, good starting was a feature of the engine. No cut-out is fitted to the Allbon, which must be stopped by either choking the air intake or by turning down the jet needle.

Running: The engine runs extremely well over a fairly wide range of speeds. Is inclined to "hunt" at the extremes of low and high speeds, but as engine output falls considerably at these speeds, they may be considered to be outside the useful range.

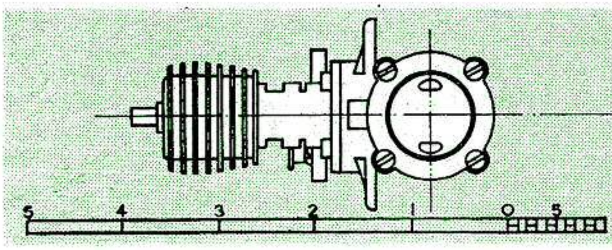
B.H.P.: As will be seen from the graph, the performance of the Allbon engine is extremely good; and the high figure of ·144 h.p. at 6,500 r.p.m. may be taken as exceptional for an engine of this capacity. The lowest r.p.m. tested was 4,000, when a figure of ·074 b.h.p. was obtained. At the other end of the scale, ·099 b.h.p. was developed at about 9,000 r.p.m. It will thus be seen that the greatest power output lies at a reasonably low speed, which is probably a good feature.

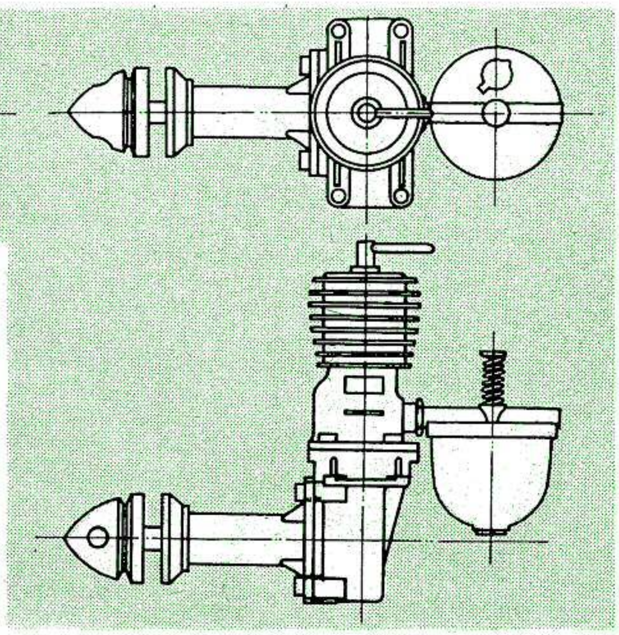
Power/Weight Ratio: ·384 b.h.p. per lb.

Remarks: This seems to be one of the most efficient engines yet tested. Throttle and compression control is excellent, and a general absence of "fussiness" was noted.

GENERAL CONSTRUCTIONAL DATA.

Name. Allbon 2·8.
Manufacturers. Allbon Eng. Co. (Sunbury) Ltd., Thames Street, Sunbury-on-Thames, Middlesex.
Retail Price. £4 . 16 . 0.
Delivery. Ex-stock.
Spares. All spares available. Repair service also available.
Type. Compression Ignition. Two stroke.
Specified Fuel. Mercury No. 3 or No. 6.
Capacity. 2·8 cubic centimetres. ·17 cubic inches.
Weight. Bare 6 ozs.
Compression Ratio. Adjustable.
Mounting. Beam, upright or inverted.
Recommended Airscrew. Free flight 11×6 ins. Control line 10×8 ins. or 9×8 ins.
Recommended Flywheel. $2\frac{1}{4}\times\frac{1}{2}$ in. Weight 6 ozs. Standard flywheel can be supplied.
Tank. Transparent plastic moulding. Last drop design.
Bore. 9/16 in.
Stroke. 11/16.
Cylinder. Meehanite, machined all over and secured to crankcase by 4 screws.
Cylinder Head. Dural, screwed to cylinder.





Contra Piston. Meehanite. Compression adjusting screw in cylinder head.
Crankcase. Diecast aluminium with detachable front cover secured by 4 screws.
Piston. Meehanite, flat topped. Gudgeon pin carrier of dural secured by screw through piston crown.
Connecting Rod. Forged Hyduminium.
Crankpin Bearing. Plain.
Crankshaft. Heat treated steel. Machined from one piece with crankpin and drilled for oil feed to bearings. Bearing surfaces ground and polished.
Main Bearing. Two heavy duty white metal bushes pressed into end cover.
Little End Bearing. Plain. Hollow silver steel Gudgeon Pin.
Special Features. Piston lapped after assembly with Gudgeon Pin Carrier and Connecting Rod.

GAS TURBINE EXPERIMENTS (*continued from page 37*)

A sheet of thin ply was inscribed with a semi-circle, this being divided into degrees and the straight edge was blanked off with two strips of ply leaving an aperture in the centre. Next a thin strip of foil was fixed over the centre line, on edge, by means of a pin to serve as a pivot. This was then secured a short distance behind the rear face of the turbine wheel, and in line with several of the uppermost blades, leaving sufficient clearance for the rotation of the wheel.

Now for the experiment ;—

First a measurement was made of the airflow in front of the turbine nozzles, this was found to be a little more than 95 ft. per sec. and making an allowance for loss through friction of 10% the velocity at the nozzle exit would be 95 ft. per sec. This then is represented by V1 on the velocity diagram. Now most of the airflow after leaving the turbine went out to exit via the turbine bullet and nozzle, but with the measuring device in place, a portion is blanked off, leaving only a small aperture through which there is an outflow of air and as will be seen from the illustration, the foil streamer will register the angle of exit. A measurement of this angle was made together with a velocity reading of the airflow at the aperture. This then represented V2 (the absolute air velocity leaving the turbine) in magnitude and direction and in this case was found to be 80° 10′, whilst the velocity was 50·6 ft. per sec.

Now by knowing the blade exit angle which was 50° 30′ we can complete the triangle DEF and then if the quantities are read off to scale, it will be seen that (U) was 48·5 ft. per sec., this checked with an r.p.m. measurement of 3,709.

If we now mark off (V1) i.e. 95 ft. per sec. at the angle 42 deg. to the plane of the wheel and (U) 48·5 ft. per sec. we can measure off the relative entrance velocity (V1r) in magnitude and direction. We may now reconstruct the velocity diagram as in Fig. 1a and reading off the velocity of whirl (HG) we get 62·8 ft. per sec. and substituting these quantities

$$YB = \frac{2U\ Vw}{V^2} = \frac{2 \times 48{\cdot}5 \times 62{\cdot}8 \times 100}{95 \times 95} = 67{\cdot}5\%$$

and $Y\ Stage = YN \times YB = {\cdot}89 \times 67{\cdot}5 = 60\%$

This then is the theoretical stage efficiency and it must be pointed out that although this may seem a high figure for a small turbine no consideration is made for the additional losses which would be involved at the much higher speeds we shall be using, due to the increased friction etc., therefore an efficiency of 58% would be more like the real value. Nevertheless this was encouraging and it would seem that if we can keep the working temperature and r.p.m. within reasonable limits, a successful gas turbine of this size is possible.

Now let us consider a turbine unit employing a centrifugal compressor of 4 ins. diameter and an intake area of ·0115 sq. ft. We found in last month's article that with a small compressor of this type, an adiabatic efficiency of 55% was possible, so that if we choose say 30,000 r.p.m. as the maximum permissible rotational speed, the tip speed will be 523 ft. per sec. and the air flow exit velocity will be approximately 460 ft. per sec. giving a pressure ratio of 1·25–1, in other words, a combustion chamber pressure of 18·4 lbs. per sq. in. absolute.

No doubt there will be some scepticism on this point as most people seem to fight shy of speeds in excess of 20,000 r.p.m. but providing the rotor is nicely balanced, greater speeds than this should be possible. Now the real snag with high rotational speeds of this order (as far as model aircraft are concerned) is the gyroscopic couples that will be set up in flight. Perhaps the answer lies in the use of a two stage centrifugal compressor, thereby permitting a much lower rate of rotation.

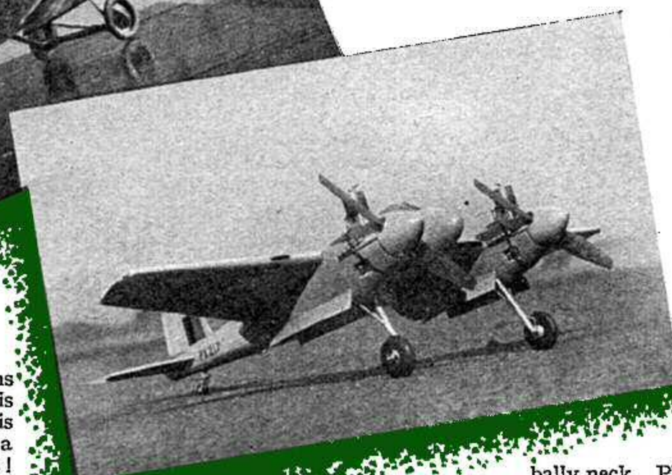
As the intake area is ·1015 sq. ft. approximately 4·18 cu. ft. of air per sec. will be used, which amounts to ·322 lbs. per sec. Now work done $= \frac{W\ Uc^2}{g}$ where W is weight per sec. and Uc peripheral speed of compressor i.e. 523 ft. per sec. so that $\frac{{\cdot}322 \times 523 \times 523}{32{\cdot}2} = 2735$ ft. lbs. of work per second would be done by the compressor, which equals $\frac{2735}{550} = 4{\cdot}97$ h.p. and under these conditions the maximum temperature in the combustion chamber would have to be in the region of 1,000 deg. cent. abs. while the absolute gas stream velocity leaving the turbine blades would be approximately 350 ft. per sec.

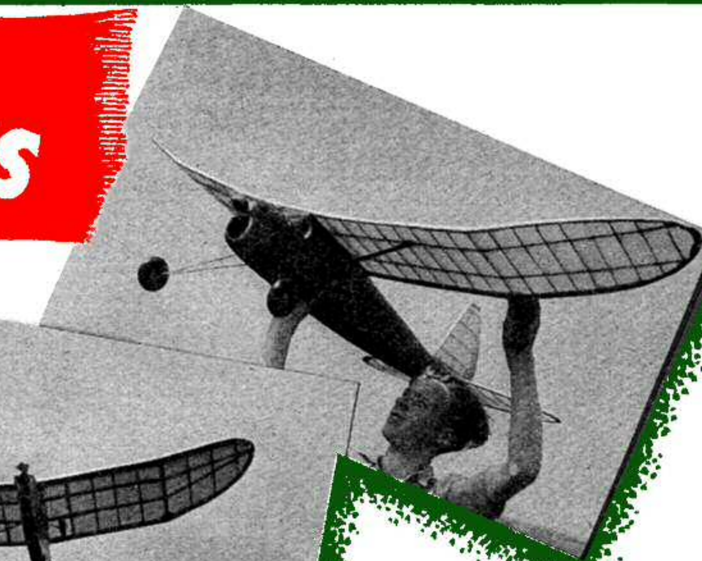
From the formula, Static Thrust=Mass per sec. × Velocity, we get $\frac{{\cdot}332 \times 350}{32{\cdot}2} = 3{\cdot}5$ lbs. and the all up weight of the unit would be approximately 2·25 lbs. Granted, this would require a rather large model, but it would enable us to explore the possibilities of the small gas turbine reaction engine.

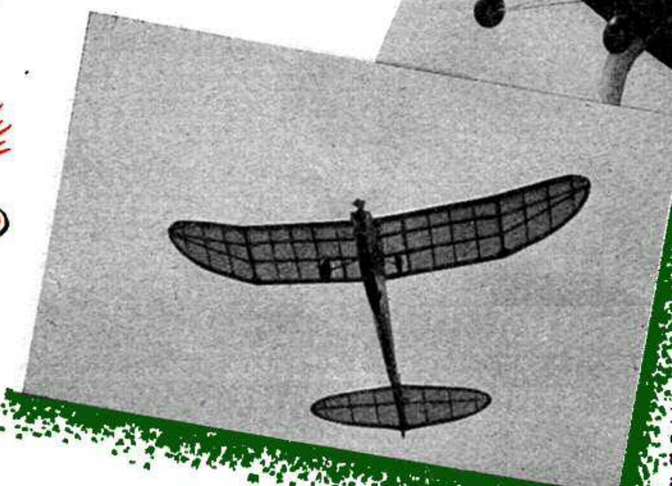
ERRATUM

On page 629 of my last article, there is a sentence that reads " Now the theoretical pressure head of water that will be produced, etc. . . . " the words " of water " should be omitted.

MODEL NEWS







FLIAR Phil hopes his descriptions will be as colourful as this month's backgrounds, and with this in view he fortifies himself with a little Dutch courage before he starts! Our Model of the Month is that rarity in this country, a twin-engined control line scale model, and in this case a very well finished D.H. Hornet made by P. D. Hickie of the Uplands M.F.C., who entered it in the recent London Area control line contests. This is a most attractive model spoilt only by the protruding engines, which alas, cannot be avoided in a model of this size without the most fearsome mechanical complications.

Top left is an interesting flying scale S.E.5 built by P. Petch of West Wycombe. E.D. powered, it is 3 ft. 8 in. span and behaves in a most realistic manner in flight. It seems a pity that the over-exaggerated dihedral detracts so much from the scale appearance. Why not fit an auto rudder, Mr. Petch, and cut down on the dihedral?

Those were the days, Sir! Fliar Phil can now reveal the secret of how Smith Minor (the cad!) collared the hand-launch record at St. Twistin's. But there is a moral to it lest you be tempted to do likewise—two seconds after, he fell clean off and broke his bally neck. Play on S-C-H-O-O-L!

Water's a bit cold this time of the year but A. K. E. Gyford of flying boat fame still paddles happily and flies this newest design of his "The Baby Gull." Span is 69 in. and length 45 in. and the model, shown not quite completed, is rubber driven. Mr. Gyford hopes that this may spur on other aeromodellers towards having a go with a drop of water. At any rate it is much softer, even if it is harder! Ha, ha, ha—ha, ha—woodpeckers to the critics.

The circle in the middle depicts M. M. Gates' rocket-propelled tailless glider in flight, with the efflux clearly displayed. The model, which is known as the "Ghoul," is 32 in. span and is still a subject of experiment.

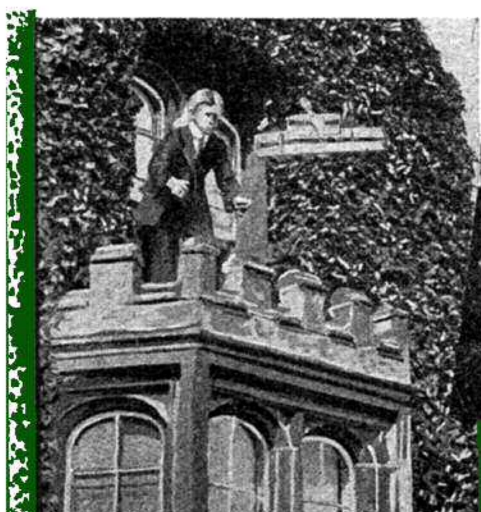
Top right again is Heyworth with his H.V.450 built from AEROMODELLER plans. The attractive semi-scale lines of this contest model are well brought out in the photograph by W. A. Barcroft.

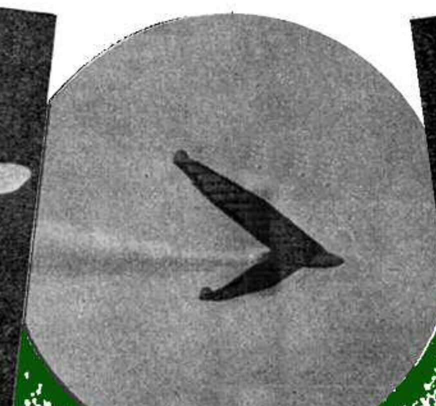
Below this is an excellent flying shot by C. J. Edwards of T. W. Putman's 44 in. span "Airflo Baby," this time powered by an Amco instead of the usual Mills. However, Mr. Putman remarks that the rather smaller power of the Amco still gives excellent results and saved any repairs throughout the dozens of flights made last season.

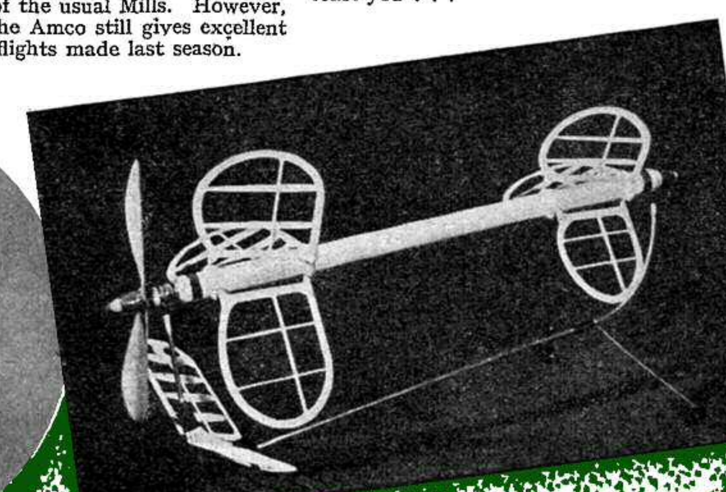
Busy Belgian model bod Guy Ramaekers sends us another photo of one of his unusual machines. He calls it a "Popular Flying Screw," and built it from an idea by Watteyne and Dambet. Length is 27 in., weight 5 ozs. Take-offs are at about 60 degrees and like an autogyro. It flies as fast as a diesel pylon job at a height of 60 feet and it is even possible to loop it by altering the incidence of the tail. Its average flying time is 45 seconds, but the builder is progressing to even bigger and better versions of which no doubt we shall see photos in the near future.

To see the old year out, here is Cyril Spray, one of our Canadian correspondents, with his "Swallow", the A.P.S. tailless glider of whose performance he writes with the highest acclaim.

Also to see the old year out, if still capable by that time, Fliar Phil creeps back to his bottle (hot-water, of course!) but stays just long enough to wish you all the very best of Christmases, and Bigger and Better PRANGS for 1949—if he had a fork he'd toast you . . .







THERMALIST I

F.A.I. MAXIMUM ELEVEN FEET FIVE INCHES SAILPLANE CONTEST GIANT

BY R. MINNEY

THE imposing contest record of this huge model culminates in the magnificent aggregate of 2093 secs., for two flights that gave Bob Minney first place in the International Sailplane Contest at Eaton Bray against such opposition as Fillon, last two years' winner, and Cheurlot, who also had an over 30 minutes aggregate.

Fuselage. Two sides of the fuselage are built in the normal way out of ¼ inch square medium balsa. Then the main fuselage former is positioned and the rear of the fuselage brought together, the cross struts are put in and the nose former fitted.

The items such as weight box, wheel cover, dethermaliser box, sheeting, etc., are positioned next.

At this point the fuselage is laid aside and construction commenced on the wing.

The ¾ inch square L.E. is shaped and laid down flat on a plan, also the T.E. As the wing is so large it is necessary to build it up in 4 pieces. The small number of ribs are cut en-bloc out of 3/32 inch sheet and cemented in position. The main T spar is then constructed and slotted into the rib tops. At this juncture the wing structure is removed from the plan, and the rear spar of ¼ inch square cemented in position. Rib members 1–6 inclusive should have holes drilled for paper tubes rolled to take a 5/8 inch diameter aluminium tube and a 3/16 inch diameter dural tube. The tubes are the next part of the construction. These are rolled and cemented in position. Next, before the outboard panels are fixed to their respective centre sections, the wing fixing is built.

Two more paper tubes are rolled for the fuselage and two airfoil sections cut out of ¼ inch sheet—one for each side of the fuselage. These are pinned roughly in position, the dowels fitted, and the centre sections fitted. These are then lined up, with correct incidence, etc., and the paper tubes and airfoil section cemented permanently into position.

The cabin windows are then glazed and the wing fixing strengthened with struts across the fuselage. The whole fuselage is covered with 1/16 inch balsa sheet, hard at the nose, soft at the tail, with the grain running crossways. The nose block is shaped and fitted, and the 4½ inch airwheel fitted.

The fin is built up flat on plan and the "thickness" added later. This fin is best made a fixture to the fuselage and the under fin is then covered with 1/32 inch sheet. A wire support from the front of the fin to the fuselage completes the fuselage construction.

Wings. These are continued by building the outboard sections, the T spar continuing to the tip. The outboard sections are then fastened to the centre sections at the correct dihedral and two 1/8 inch ply dihedral braces fitted to each wing. The leading edges are sheeted with 1/32 inch hard balsa, and the inside top of the T.E. sheeted with 1/16 inch sheet.

Tailplane. The construction of this is very simple, with its flat underside and large rib spacings.

Covering. The fuselage was sanded and covered with one layer of rag tissue. The fin was treated in the same manner.

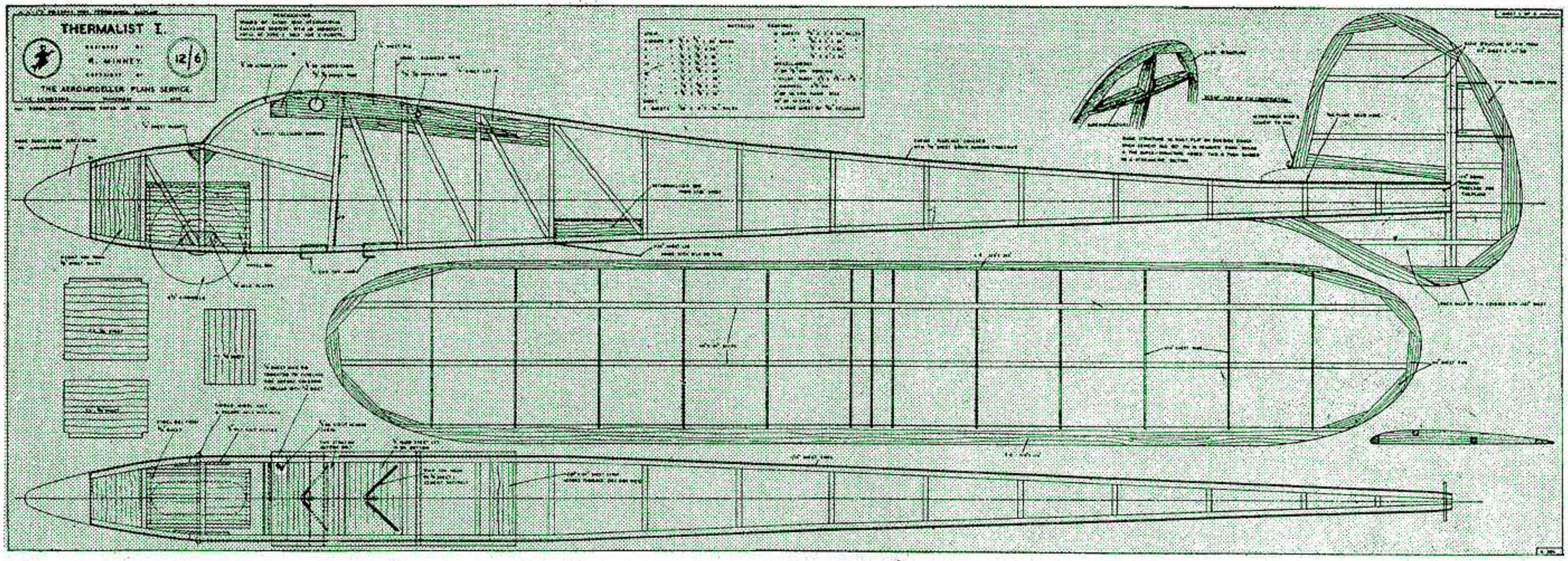
The wings and tail were covered with rag tissue and given one coat of thin dope.

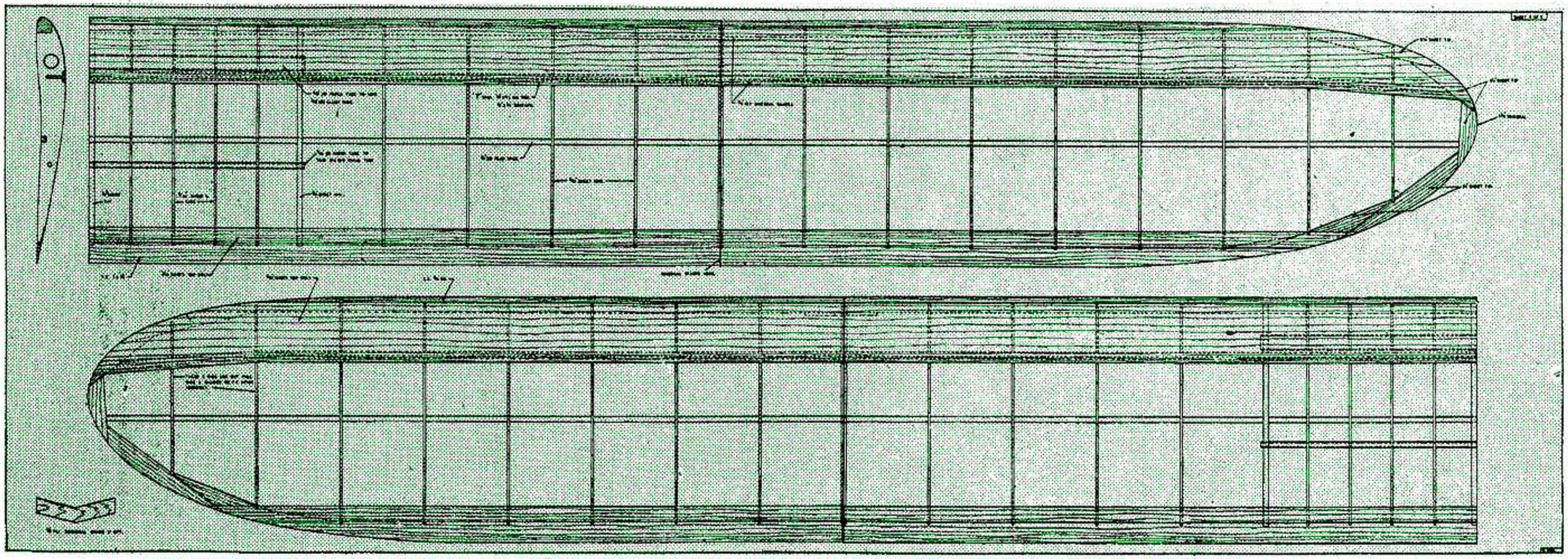
The second layer of tissue on the wings and tail was orange English tissue. This could only be applied with tissue **cement** as paste would not stick to the dope underneath. This second covering was steam shrunk and doped with one coat of thickdope, and one of banana oil or varnish.

The fuselage was given two coats of clear dope and two coats of "Catesby's" brushing cellulose, black. The fin was similarly treated.

Flying. The model balances under the rear main spar, and should require about 1 lb. of lead in the nose. The all-up weight should be about 4 lbs.—well above F.A.I. weight.

The initial tests provide no great difficulties, the glide being slow and flat. When towing up remember that the model is fully strong with plenty of area so that a strong pull may be applied to the towline—of **string**—without fear of the wings breaking. The only hook so far used has been the front, the rear one being kept for dead calm days.



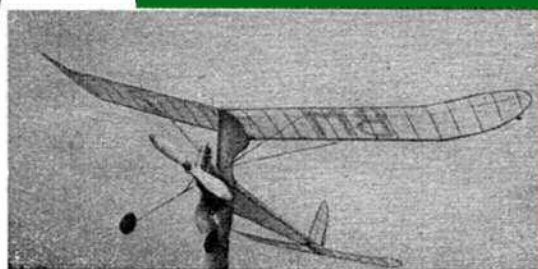


FULL SIZE DRAWINGS OF THIS ⅛th SCALE REPRODUCTION ARE AVAILABLE PRICE 12/6 POST FREE, FROM THE AEROMODELLER PLANS SERVICE.

AEROMODELLING IN HUNGARY

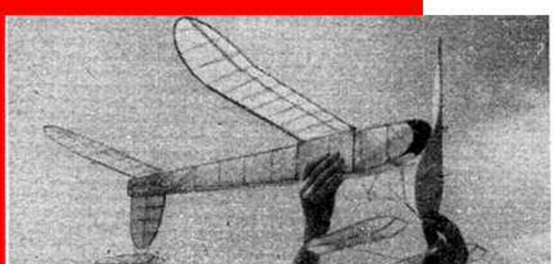
ACHIEVEMENTS OF A SMALL BUT ENTHUSIASTIC COUNTRY DESCRIBED BY DR. ING. GEORGES BENEDEK.

The author with his rubber powered hydroplane—holder of world duration and distance records in its class.



Top: An elegant pylon type power model featuring a Czech Super-Atom diesel engine. There are no native manufacturers so engines must be home-made or imported.

Another duration model—once more with the popular underfin! Both mainplane and tail are again heavily undercambered.

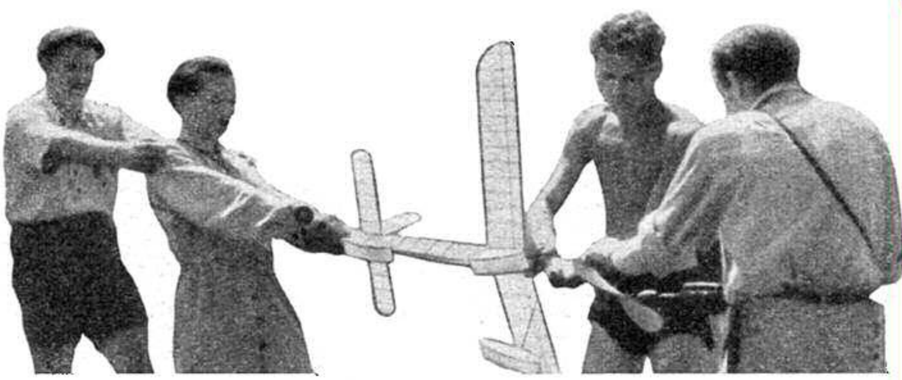


Top: Typical rubber model. Note parasol mounted wing and tailplane, and location of fin.

Centre: Parasol wing sailplane with undercambered tailplane. Best time with this model 12:45.

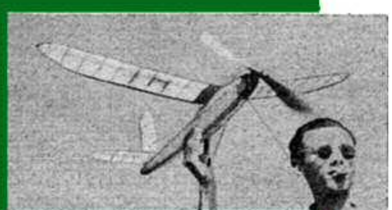
Bottom: The underfin again! This time serving as support for third float in a seaplane.

Theodor Foth—one of Hungary's leading sailplane enthusiasts—with his model at their 1948 Nationals held at Miskolc. Almost a "suit-case" fuselage.



Hungarian rubber is hard! This picture demonstrates the stiffness of the native product. Becoming flying attire of the gentleman at the tail end will be admired.

Butterfly tail sailplane by Belhazy, which has best time of 44:48.
A neat "orthodox" rubber model, with time to its credit of 27:10, built by Francis Bogyo.
Ralph Beck with his National's Winner which clocked 54:05.
The author with a duration version of his record holder.
A simple petrol model reminiscent of pre-war British designs.
Typical central European model sailplane similar to Czech designs.



SOME HUNGARIAN NATIONAL RECORDS

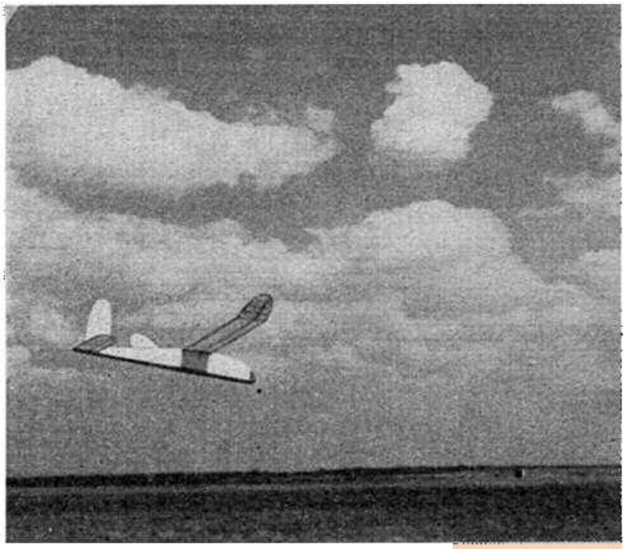
Rubber Models		
Duration : G. Meszetler	61:22	31.8.48
Distance : G. Benedek	50·26 km.	20.8.47
Power Models		
Duration : G. Benedek	67:20	29.6.44
Hydroplanes—Rubber		
Duration : G. Benedek	29:10	6.5.48
Hydroplanes—Power		
Duration : C. Somhegyi	8:17	12.8.44
Sailplanes		
Duration : E. Papp-Simon	1:58:20	20.6.44
Distance : F. Bogyo	50 km.	20.8.47
Indoor Microfilm		
Duration : G. Benedek	10:08	1.6.48
Indoor—Paper Covered		
Duration : R. Poich	5:36	8.7.48

FIRST I must explain that our climate is different from yours; and the materials we use are also different. Balsa wood is so scarce in Hungary that we use it regularly only for indoor models. There are very few modellers who still possess any stocks, and they use it sparingly mixed with pine and plywood. Our soaring models are built entirely of pine-wood strip and plywood. Their wing ribs and formers must be cut from 1–1·5 mm. beech three ply. This is wearisome work; and a sailplane of 5–6 ft. or a rubber model of 36–40 ins. span takes something like 40–50 hours to build. Not many rubber powered models are being built owing to the difficulty of getting good quality rubber. Indeed, we have only a few ounces of English strip in the whole country, which we are keeping for indoor use. Our native rubber is very stiff and hard, so that only a limited number of strands can be used in making up a motor, and even then not more than 500 turns can be given, resulting in a running time of 20–30 seconds. Engines of any kind—either petrol, diesel, glow plug or even compressed air—are scarce, and we can only keep in touch with current developments in power modelling by studying the occasional foreign magazines that we obtain from time to time. In a few words then, we are very badly off for materials of all kinds.

Aeromodelling really started in Hungary in 1940. Until then very few people had gone in for either building or flying models. But since then the number of model aeroplane clubs has been steadily increasing. The former Hungarian Aero Association established a number of areas, and by 1942 fourteen provincial centres were in operation handling club activities on a decentralised basis. These areas included parts of Hungary now ceded to Roumania, but so popular and enterprising has been the central control that even to-day in Transylvania, for example, aeromodellers continue to work with the assistance and under the control of the central Hungarian Aero Club.

To start with, our models followed foreign practice, especially German design, but as we developed we established our own individual style, though with regard to power models the American pylon type has been favoured from the beginning.

We soon discovered that many of our ideas were not very sound, but now after four years' theoretical work we feel that we have laid the foundations of our own school of thought in aeromodelling. Unfortunately, the small wind tunnel built for us in the experimental department of the University of



Gyurko's model on its winning flight in the 1948 Nationals. This picture gives a good idea of the usual type of weather—look at those lovely thermal-bearing clouds!—and the wide open spaces.

Technical Science was destroyed during the seige of Budapest towards the end of the war.

At first our modellers believed that the streamline fuselage was best but we have found the difference between such a model and a slabsider to be so small as not to be worth the extra trouble building, particularly as we have only hardwoods with which to work. In the same way our early preference was for elliptical wings, but we have now turned to the simplest possible parallel chord wings with slightly rounded tips.

In our early days, particularly, we favoured the usual airfoil sections such as R.A.F. 32, N.A.C.A. 6412 and some of the Gottingen sections, but we have now developed a completely new series of airfoil sections that are essentially our own, these number no less than twenty nine different profiles with varying thicknesses from 3 per cent. to 12 per cent. and varying cambers. We have been very successful with the 3 per cent. thick airfoil for our rubber models, although being so thin they do present special problems of construction but results are sufficiently better than the older section to be worth the extra trouble. Using our airfoils we have found an improvement in the sinking speed up to 25 per cent. Comparative figures are :—Normal thick airfoil, best sinking speed 32–40 ins./sec., Hungarian airfoil 24 ins./sec. Both figures referring to medium sized rubber duration models.

We have also improved sinking speeds of our sailplanes, with 6 ft. or more span although here the improvement is not so great. All Hungarian models, incidentally, are built to F.A.I. formula and we have recently introduced a "Wakefield" class as well. In the past most of our sailplanes were designed for slope soaring but we are now developing tow-launch successfully which not only is improving all round performances but is extending the life of the models considerably. The climate in Hungary is, we consider, very satisfactory for model flying. From the beginning of March up to the end of October, there are usually thermals from 8 a.m. to 6 p.m., particularly in July and August. Thermals are often found even after 6 p.m. in the plainland, sometimes with a totally obscured sky or after sunset. All our research has been devoted to reducing the sinking speed of the models in every possible way, while keeping within the F.A.I. formula. So as to make the most of this plentiful supply of thermals, we have also concentrated on design for the slowest possible forward speed which enables models to be trimmed to fly in smaller circles and thus keep within quite small thermal bubbles. In this connection our range of airfoil sections has been of great practical assistance to our modellers.

During 1948 our contest programme was arranged on knock-out principles which may be of interest. From 1st May to 15th June the various clubs held their own individual contests. Then, from 20th June to 25th July, the six main areas held contests for the club winners ; again, sending forward winners to a National Contest Camp from the 14th to the 20th August.

In September, we held an International event conforming to "Wakefield" rules, open to the Danubian States, but only Yugoslavia took part this year. Competition was very keen and after a hard fight the Hungarians won. It is interesting to compare the winning times with those obtained in the "Wakefield" Contest at Akron this year.

We are now very busy building indoor models. Our great difficulty is lack of halls sufficiently large. Our best performance of 10 : 08 was flown in a small gymnasium only about 40 ft. high, this model was microfilm covered. Our best tissue covered model flight is 5 : 30.

Generally our standard is steadily improving and we are all working very hard to make good the ground lost because of the war. In time we hope to catch up with other countries who have been aeromodelling longer than we have, and also to send teams to take part in contests abroad, not so much in the expectation of winning, but rather so that our members can learn from others. We were not able to take part this year, but hope we may have the chance in 1949.

INTERNATIONAL CAVALLONI CUP CONTEST

To strict Wakefield Rules, 12th September, 1948

		1.	2.	3.	Average
1.	L. Poich Hungary	1:49	2:17	23:05	9:03·6
2.	L. Winkler Hungary	1:49	3:37	16:48	7:24·6
3.	V. Stojadinovic Yugoslavia	:54	1:15	16:50	6:19·6
4.	G. Benedek Hungary	2:42	3:15	12:28	6:08·3
5.	G. Meszetler Hungary	2:16	2:31	12:45	5:50·6
6.	T. Tasic Yugoslavia	17:18	-	-	5:46·7
7.	G. Krizema Hungary	1:08	11:45	-	4:17·6

Most successful club in 1948—the Cavalloni M.A.C.—composed of students at the Matyas Gymnasium, equivalent of a British High School, although usually co-educational.

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For however heavily your plane lands you can rest assured that the JETEX unit at least, will remain completely undamaged, and ready as ever for the next flight.

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Tubes containing 12 plastic igniter wicks 6d. and 9d.

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● The "JETWING" fitted with a JETEX 100 unit took 2nd place in the Isle of Man Jet contest. Plans of this model (giving full size parts) are featured in the latest issue of Model Aviation Series "MODEL PLANES ANNUAL 1949." On sale now

42" SPAN POWER MODEL

The Wren

BY G. R. WOOLLETT

OVER eighty flights have so far been made with this model and no damage has been sustained whatever—even to a propeller. It has "landed" in trees on two occasions, quite unharmed. Even in high winds it can be taken out with confidence as it is very stable and docile to handle.

If you want a power model that will keep the repair equipment in the toolbox the "Wren" will give full measure of flying hours.

Fuselage. Begin the fuselage by tracing the side outline on to 1/16 inch sheet deleting the curved decking immediately behind the top of former C above the 1 mm. ply stiffener. Cement the 1/8 inch square longerons and bracing struts where indicated. Cut out and attach the two 1 mm. ply stiffeners to the inside of each fuselage side with Durofix. When set, drill the lower one. Connect the two sides by cementing in position the two formers D and E, then cement the sides together at the rear end. Add the cross struts, top and bottom. At this stage fit and cement paper tube for the undercarriage rubber band and beneath it the 3/16×1/4 inch balsa support. The rear undercarriage attachment brass tube is now pushed into position and a piece of wire soldered to each end to prevent it from sliding out. No other fixing is necessary.

Cut out the formers A, B and C, and Durofix B and C together. Ensure that A aligns accurately on the front of B when the locating piece is screwed in position. A good fit is necessary here. Bend and screw in position the wire retaining hooks on each side of the rear of former B. File the ends of the screws where they protrude. Solder the two ends of the wire as shewn. Durofix front former accurately to the fuselage.

Sheet in remainder of fuselage and also the wing platform between the top of formers D and E. Note that fuselage bottom sheet ends midway along the paper tube support and an insert of 1/16 inch ply completes the underside to the front. Drill holes for the rear wing dowel and tailplane dowel—do not fit them yet. Cement front wing dowel and balsa fairing.

Knock-Off Engine Mount. Glue the two bearers into the slots cut in former A using Croid or similar glue. Glue and screw the 1/16 inch ply side webs and check with a square before putting aside to set.

Mark out and drill the bearers to the dimensions shewn on the plan. This model can be adapted for either the "Mills" or the "E.D." diesels. If a "Mills" is being used the dural adaptor plate will have to be used. The spinner position shewn is that for the "Mills" installation. Fit the 6 B.A. retaining bolts and fill the threads with solder. Durofix the 1/2×7/16 inch side fairings to the bearers then give them and the webs two coats of dope as they will be difficult to coat when the cowl is complete.

Fit engine temporarily. With spinner backplate S.2 glued to the airscrew, align and glue the nose cowl to the bearers. Glue on S.3. Remove engine and complete rest of cowling. It will be necessary to adopt planking methods at the bottom to follow the line of the nose cowl. Fillet the inside of the nose cowl to reinforce the joint to the side pieces. Carve top cowl, cement and pin the two press studs in place.

Sand the whole and liberally coat interior with clear dope or thinned down cement to render it oil resisting. Coat outside with cement, allow to set before sanding smooth. Complete the spinner.

Undercarriage. The five pieces of 16 s.w.g. piano wire are bent as shewn, bound with florists' wire and soldered. Hooks for the retaining rubber bands are positioned and soldered to the structure. An 1/8 inch balsa fairing is then cemented in each side frame and double covered with tissue then given three coats of dope.

Mainplanes. These are quite straight forward if building is carried out in the following order:—Cement the two pieces of 1/16 inch sheet for the trailing edge undersurface lightly score beneath R.2 position for dihedral. Pin over plan packing up the front edge with 1/16 inch scrap; leave the dihedral break for the moment; pin mainspar on plan packing it up with 5/32 inch sheet, scrap; cement ribs in position; add leading edge and cement liberally; ensure that L.E. extends above ribs by 1/16 inch to accommodate the sheet covering; fit tips and top spar; cement on the T.E. 1/8×1/2 inch strips in convenient length then the T.E. gusset; sheet cover top surface back to top spar with 1/16 inch balsa.

Prop up wing tip to the correct dihedral and complete the centre-section. Sand T.E. and L.E. to correct section and round off tips.

When building the remaining wing use the finished one with its dowels in position to correctly align the other half centre-section root ribs.

Tail Unit. The fin and tailplane are built over the plan in the usual manner. It is advisable to fit the fin in position on the fuselage before the cement holding the paper tube in the tailplane is set. At the same time the paper tube locating the fin on the fuselage can be cemented between its cross struts while the assembly is vetted for alignment. Allow to set thoroughly before removing fin and tailplane. Coat fin dowel with tallow before inserting to prevent it sticking to the tube.

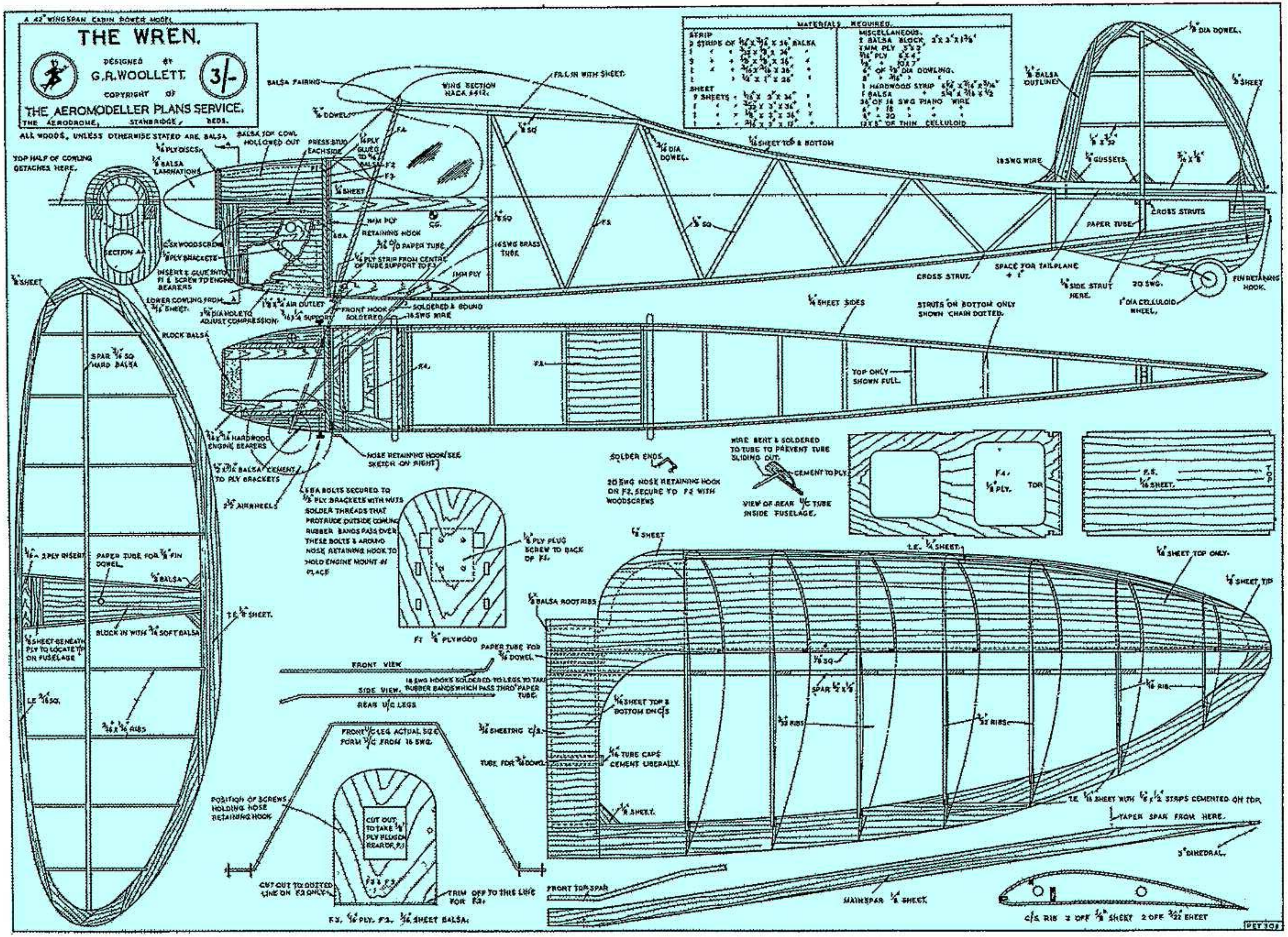
Covering and Finish. On the original model all surfaces were covered with red bamboo tissue and the fuselage and undercarriage given three coats of red dope. The mainplanes and tail unit were water shrunk and then two coats of clear dope applied, finally one of banana oil.

Fuselage trim is in yellow as are the fin and mainplane numbers and the name "Wren" beneath the cockpit.

Flying. Test glide the model over long grass on a calm day after checking the rigging. The C.G. position is marked and very little adjustment should be necessary if the "Mills" is being used. Alter the tailplane slightly for small adjustments.

For the "E.D." installation it is a good plan to sheet the fin and undersurface of the tailplane with 1/32 inch balsa rather than resorting to ballast.

Slight right sidethrust plus fin offset to starboard resulted in a spiraling climb to the left with a right hand circuit for gliding.



A 42" WINGSPAN CABIN POWER MODEL
THE WREN.
DESIGNED BY G.R.WOOLLETT.
COPYRIGHT OF THE AEROMODELLER PLANS SERVICE.
THE AERODROME, STANBRIDGE, BEDS.
3/-
ALL WOODS, UNLESS OTHERWISE STATED ARE BALSA
MATERIALS REQUIRED.
STRIP
SHEET
MISCELLANEOUS.
THIN CELLULOID
WING SECTION NACA 6412.
BALSA FAIRING
FLUSH WITH SHEET.
TOP HALF OF COWLING DETACHES HERE.
BALSA TOP COWL HOLLOWED OUT
PRESS STUD EACH SIDE
BALSA LAMINATIONS
PLY DISCS.
SECTION AA
C.S.K WOODSCREW
PLY BRACKETS
LOWER COWLING FROM SHEET.
AIR OUTLET
ADJUST COMPRESSION.
FRONT HOOK SOLDERED
SOLDERED & BOUND
18 SWG WIRE
1MM PLY
RETAINING HOOK
PAPER TUBE
16 SWG BRASS TUBE
C.G.
SHEET TOP & BOTTOM
DIA DOWEL.
18 SWG WIRE
GUSSETS
CROSS STRUTS
PAPER TUBE
CROSS STRUT.
SPACE FOR TAILPLANE
SIDE STRUT HERE.
20 SWG.
1" DIA CELLULOID WHEEL.
FIN RETAINING HOOK.
DIA DOWEL.
BALSA OUTLINE
SHEET
SHEET SIDES
STRUTS ON BOTTOM ONLY SHOWN CHAIN DOTTED.
TOP ONLY SHOWN FULL.
BLOCK BALSA
HARDWOOD ENGINE BEARERS
BALSA CEMENT TO PLY BRACKETS
AIRWHEELS
NOSE RETAINING HOOK (SEE SKETCH ON RIGHT)
SOLDER ENDS.
20 SWG NOSE RETAINING HOOK ON F2, SECURE TO F2 WITH WOODSCREWS
WIRE BENT & SOLDERED TO TUBE TO PREVENT TUBE SLIDING OUT.
CEMENT TO PLY.
VIEW OF REAR U/C TUBE INSIDE FUSELAGE.
F4. PLY. TOP
F.5. SHEET. TOP
6 BA BOLTS SECURED TO PLY BRACKETS WITH NUTS SOLDER THREADS THAT PROTRUDE OUTSIDE COWLING RUBBER BANDS PASS OVER THESE BOLTS & AROUND NOSE RETAINING HOOK TO HOLD ENGINE MOUNT IN PLACE
PLY PLUG SCREW TO BACK OF F1.
F1 PLYWOOD
SPAR HARD BALSA
PLY INSERT
PAPER TUBE FOR FIN DOWEL.
BLOCK IN WITH SOFT BALSA
SHEET BENEATH PLY TO LOCATE TP ON FUSELAGE
RIBS
T.E. SHEET.
SHEET
FRONT VIEW
SIDE VIEW.
REAR U/C LEGS
18 SWG HOOKS SOLDERED TO LEGS TO TAKE RUBBER BANDS WHICH PASS THRO' PAPER TUBE.
FRONT U/C LEG ACTUAL SIZE FORM U/C FROM 16 SWG.
POSITION OF SCREWS HOLDING NOSE RETAINING HOOK
CUT OUT TO TAKE PLY PLUG IN REAR OF F1
CUT OUT TO DOTTED LINE ON F3 ONLY.
TRIM OFF TO THIS LINE FOR F2.
BALSA ROOT RIBS
PAPER TUBE FOR DOWEL.
SHEET TOP & BOTTOM ON C/S
SHEETING C/S.
TUBE CAPS CEMENT LIBERALLY.
L.E. SHEET.
SHEET TOP ONLY.
SHEET TIP
RIB.
RIBS
SPAR
SHEET.
T.E. SHEET WITH STRIPS CEMENTED ON TOP.
TAPER SPAR FROM HERE.
DIHEDRAL.
FRONT TOP SPAR
MAINSPAR SHEET.
C/S RIB
PET 309

THE FLYING SCALE MODEL

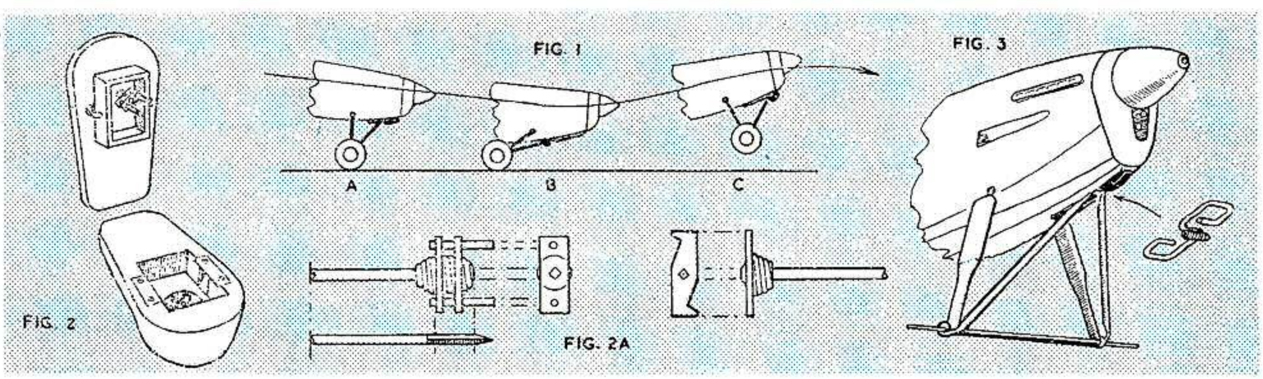
PART EIGHT

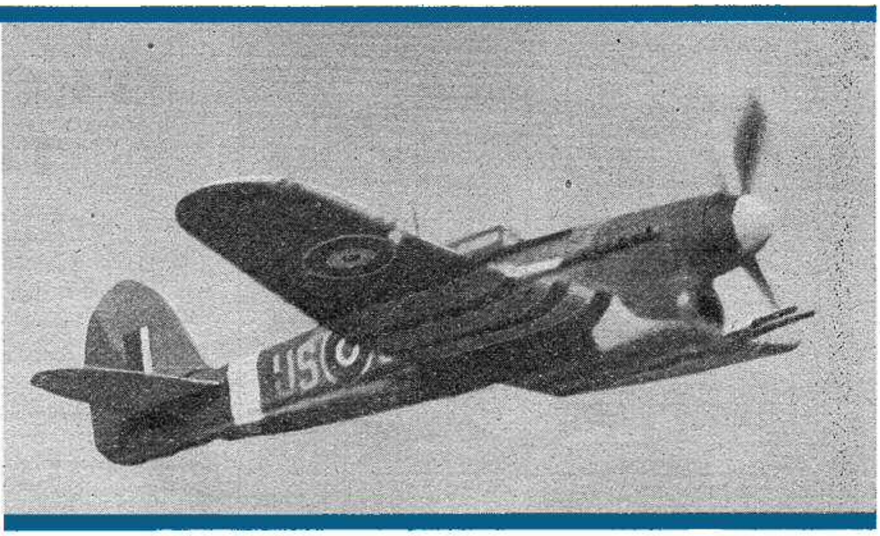
BY

C. RUPERT MOORE, A.R.A.C.

HAVING dealt with "how to shed wings in a graceful manner" I propose to turn to undercarriages. Like most model problems the undercarriage problem is totally different from the full scale one. Rarely, if ever, does a model stall itself on to the ground and whole of the shock is in a backward direction. Fig. 1 shows a typical model landing. (A) is the moment of touch-down, (B) the backward travel which puts the shock absorber in great tension, and (C) the rebound and backlash of the shock absorbing system returning to rest. This shows a landing under perfect conditions, but it is rare that a model chooses smooth ground to land on. Imagine (or remember ! !) the effect of the usual tufts of grass several inches high or the pits made by hoofs on a frosty morning. It is similar to landing a real Tiger Moth through scrub interspaced by three foot deep " fox holes." The only possible way for an undercarriage to survive under these conditions is to allow the backward and upward travel to take its natural course through a quarter of a circle or more until the belly of the model touches the ground, in effect allowing the model to make a belly landing if a normal one is not practical, the choice being left to the ground surface itself. The strength of the shock absorber should be adjusted until this great travel takes place only under the most desperate circumstances. Experience has taught me that BACKLASH is usually the most destructive force. A heavy model landing under bad conditions will spread the shock over a period of one-fortieth of a second of progressive resistance, as the model usually rebounds the wheels are free to return against *no resistance at all*. If this backlash is not cancelled out somehow, the destruction of the model is only a matter of time, even under perfect conditions. This is more acute where the undercarriage is on the wing spars because there is less structure to anchor the legs to and also the thin wing usually means the use of a very short lever arm with the consequent powerful shock absorber. It is obvious from this reasoning that an undercarriage of this type can be little protection to the airscrew.

Scale airscrew ground clearance—for please don't forget I am dealing only with scale models—makes the position more desperate than ever. It is made even more hopeless by the position of the undercarriage just forward of the C of G. Luckily the solution is simple. These drastic conditions never take place during take-off as one chooses a suitable ground surface. This means one has only to consider the airscrew under two conditions, a bad landing on rough ground and a crash landing under full power. With rubber this is completely solved by having a "knock-offable" false nose block, I show in Fig. 2, the principle as applied to my Tiger Moth. The propeller shaft is cut in two, the rear portion has a fork built up on the front end, the prongs of which engage a T on the rear end of the front half. A box of hard wood is built round the fork over which fits the false nose. The nose is held in place by two powerful 20 s.w.g. piano wire clips which engage folded tinplate catches screwed to the false nose. The method of building the fork and T piece is important (Fig. 2A.) The shaft end should be filed to a square for at least ⅜ in. and the end formed into a sharp point. A strip of brass should be folded double and the shape of the fork plate marked out. The prong holes should be drilled full size, the prongs themselves being cut from the toughest piano wire or better still steel knitting needles. The shaft hole should be drilled slightly under size and the square shaft gently hammered through. The shaft should be removed and the plates cut out. Don't forget to mark them so that they can be replaced the way they were made, shaft plates and fork prongs should be tinned well with Tinman's solder, not cored solder, wiped clean and assembled. Before adding the prongs, build up a collar of fuse





Left is the authors original Viper still in excellent flying trim after a prolonged life of 13 years. Right, his rubber driven scale Typhoon featuring a fully retracting and detracting undercarriage that is most successful in operation. Mr. Moore will be dealing with retracting and detracting mechanisms in a later article.

wire between the behind and the fork plates and then solder solid. The T piece is drilled undersize and forced on to a square shaft. A similar collar of fuse wire and solder is built up behind this T piece also. Another method which avoids the complication of a fork and T joint is to fit a self-locking airscrew by means of a simple tensioner which locks the airscrew horizontally. This latter method was used on Viper II, shown in the top left hand photograph, both self locking and false nose block were used on the Tiger Moth because of the C of G—wheel position plus airscrew clearance. The Typhoon, (top right and frontispiece) had a knock-offable false nose block. The frontispiece shows the model flying with undercarriage down, and the top right hand photograph with wheels up, note the tailwheel retracts as well. Also note how unobtrusive the "Invisible Slots" are. The false nose block makes an undercarriage unnecessary for landing. The model can and has been flown into the ground with full power on and wheels up. All that happens is there is a hideous noise (which needs careful training to get used to) as the motor unwinds in a split second. The airscrew flies off and much to everyone's surprise one just clips the nose block back again and proceeds to rewind the model. The undercarriage of course is usually allowed to detract for landing. Diesel engine models solve their own difficulty. The airscrew is fitted in such a position that compression causes it to stop in a horizontal position as is done for control line models. I have already demonstrated that fine pitch airscrews offer more resistance free wheeling than locked.

The most efficient undercarriage I have ever used is that of the Viper II shown in Fig. 3. The rear legs are free to hinge backwards or forwards. The front legs have loops on their bottom ends to hinge on the axles and at the apex at the top end of the legs is swivelled a sort of square S hook. This S hook is held tight under the nose by two rubber bands. The one forming the shock absorber is hooked on the front hook, stretched forward through the front anchorage loop and hooked back again. The other in a similar manner goes from the rear hook to the rear anchorage forming the damper. The damper is half the thickness and half the length of the shock absorber and is therefore in greater tension. This rear rubber absorbs the WHOLE of the backlash. A variation of this is used on my Tiger Moth but there the backlash is taken by making the rubber shock absorbers pass through two holes under the cowling which are closer together than the rubber anchorages on the front legs (Fig. 4.) This causes the rubber to be bent at right angles when at rest, thus opposing the tension of each shock absorber to cancel out its mate. Fig. 5 shows the Viper principle applied to a "Sopwith Pup," "Camel," "Triplane," "Snipe," "Salamander," etc. Here the shock absorbers go up the front bulkhead. The rubber bands slide over rounded corners covered with thin celluloid. I always lubricate rubber bands with castor oil which not only makes them slide nicely but prevents perishing. It is surprising at what an angle the rear legs can rake forward before the system looses its efficiency, but with heavy models it is advisable where possible to have the rear leg hinge working in a slot, the legs being held down by a powerful rubber band in order to reduce the initial shock. Where the rake becomes too great the whole system can be fitted in reverse and I have shown in Fig. 6 this method used on a flying scale model "Hawker Fury." To reduce friction two paper rollers were fitted on the top of the rear undercarriage legs.

The final adaption I show of this system is to be used on my twelve-scale "Short Scion". The undercarriage is hinged just inboard of the engines and also on the axles. The wheels are carried on a frame which is "shocked" and "damped" by four rubber bands. This frame is free to slide backwards, forwards or twist sideways.

FIG. 4

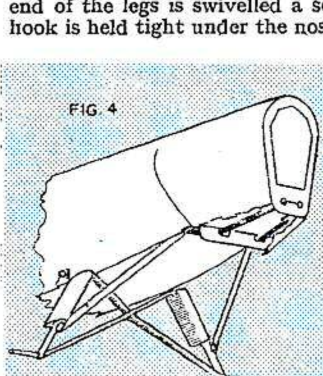


FIG. 5

FIG. 6

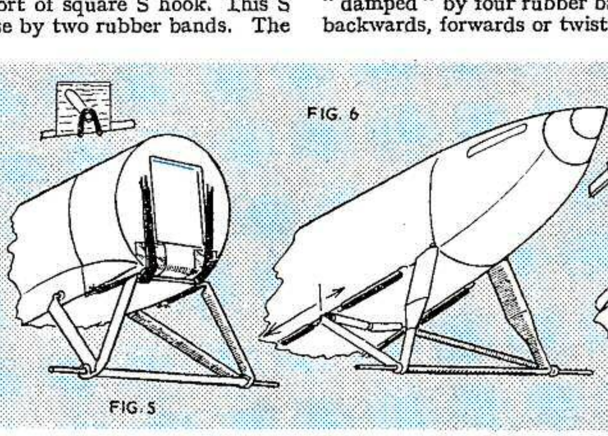
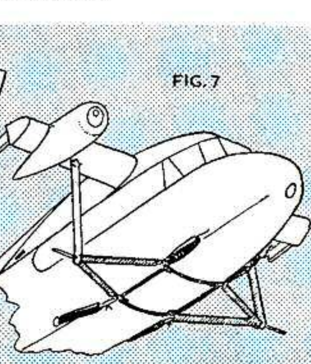
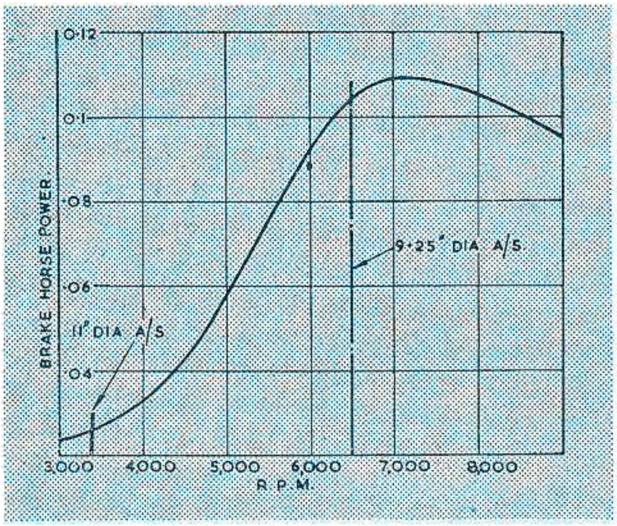


FIG. 7





TECHNICAL TOPICS

BY P · R · PAYNE

In a letter published in the October issue, a reader was "amazed at the absence of articles dealing with radio-controlled model aircraft".

When one considers the small number of modellers who have the necessary knowledge and money, the problem is not insoluble. But since it now appears that British manufacturers are taking an interest, it may not be out of place to give a short resume of the contemporary situation.

Frequency.

A beneficent Post Master General has given us the use of bands 460–461 Mc/s and 24.62–24.77 Mc/s, of which the latter is probably the easiest to use. This corresponds to a wave length of just over 12 meters, which is just about the shortest a normal wireless set can handle.

460 Mc/s gives a wavelength of only 0 652 meters, and it is difficult to obtain small valves which will work under these conditions. On the other hand the transmitting aerial—always a critical component—need only be about a foot long, as against 20 feet long for the 24 Mc/s system. Moreover, the width of the band, (or the variation allowed) is one Mc/s (1,000,000 cycles per second) as against only 0·15 Mc/s with the smaller frequency.

Reducing all this to intelligible English, we may say that 24 Mc/s is easy to use for simple radio control, but it results in heavy components and is not suitable for any system using more than one frequency.

The use of 460 Mc/s, on the other hand, enables more efficient systems to be used, but it is often difficult to obtain suitable components.

Sequence Control.

This method of control is described in Peter Hunt's book "Radio Control" (Harborough) and was used on nearly all the models built when the subject was in its infancy.

The principle involved is similar to that of a telephone: in this case a selector switch is arranged to give a sequence of operations such as,

Position 1. Rudder Right.
„ 2. Rudder Central.
„ 3. Rudder Left.
„ 4. Elevator Up.
„ 5. Elevator Central.
„ 6. Elevator Down.
„ 7. Engine Throttled Back.
„ 8. Engine Off.

The transmitter is arranged to send out a series of isolated signals, usually with the aid of a telephone dial.

Thus, if it is desired to throttle back the engine, seven signals (– – – – – – –) must be sent out, enabling the selector to pass over seven positions to reach the desired one. Then, to turn the rudder to the right, say, a further two (– –) must be transmitted. This is all rather clumsy to use, and since the controls can only be used in the "full on" position, the model must possess a high degree of inherent stability.

For example, suppose "Elevator Down" is selected; in order to dive the machine: immediately another signal (– – – – – –) must be sent out to centralise it. But with the time taken by six signals and various time lags which are essential in the selector, it is probable that the machine will have completed an inverted loop!

However, the apparatus required is commendably simple, and it is quite suitable for use with slope-soaring gliders, say, where only rudder control is needed.

Audio Frequency Control.

Broadly speaking, each control is here allotted a special frequency, and can therefore be operated straight from the transmitter. It is also possible to make the application of control, fully proportional, as demonstrated on the L.S.A.R.A. exhibit at the "Model Engineer Exhibition".

The disadvantages of this system is that the various control frequencies must be fairly widely spaced in order to prevent interference, whereas the restrictions imposed by the above mentioned P.M.G. prevent just this. Obviously not many "widely spaced frequencies" can be crammed into a band which is only 1 Mc/s wide . . .

Square Wave Systems.

The basis of these systems is a very neat piece of electrical "jiggery pokery" with signals which can be sent automatically by the transmitter, the controller only having to move a "joystick". This system appears to have a big future, and the L.S.A.R.A. is devoting a considerable amount of time to its development.

One of the most attractive features is that only a very small amount of apparatus is needed in the machine.

Commercial Units.

The E.D. control unit is a good example of a commercial "sequence" design. The total weight of apparatus carried in the model is given as 12 ozs., to which must be added batteries, servo motors and control linkages; probably the total additional weight in a model would be about 35–40 ozs., which calls for a wing area of between 800 and 1,000 square inches, and a 10 c.c. engine at least.

Another design the "Mercury Cossor", produced by A. C. Cossor, Ltd., for Mercury Models also employs sequence control and is of the single channel type with a clockwork servo. Both full and half movement of the elevators and rudder are given and also engine control. The all up weight of flight equipment is 26 ozs. and this can be reduced to 18 ozs. by employing smaller capacity batteries which naturally reduce the performance to some extent. Effective range is given as half a mile and maximum range as three miles.

TORQUE.

"Readers' Letters" has seen a casual but protracted argument on torque, over the last six months or so, and it seems appropriate to introduce a Nomogram on the subject. Moreover, the writer was talking to somebody (unfortunately unknown) at the M. E. exhibition, and was agreeably surprised to learn that his club members measured the torque of all their engines as a matter of course, although they did not trouble to convert the results into brake horse power. Thus, this month's Nomogram is dedicated to that unknown club.

Now, the basis of the controversy in "Readers' Letters" was the assertion that a coarse pitch airscrew "gave less torque" than a fine pitch one, in spite of the fact that "*more power is required to drive the slow speed airscrew*" i.e., the coarse pitch one presumably. The italics are mine . . .

Finally Mr. J. C. Gibbings has called forth confusion by saying that a reduction gear will increase airscrew torque; true of course, but then so is a lemon . . .

The solution to all this is to be found in Fig. 1, which is the b.h.p. curve for the Dyne. 3. Suppose we construct two airscrews for this engine; one 9.25 inches diameter and one of 11 inches diameter. On the *Aeromodeller* test engine their performances will be :—

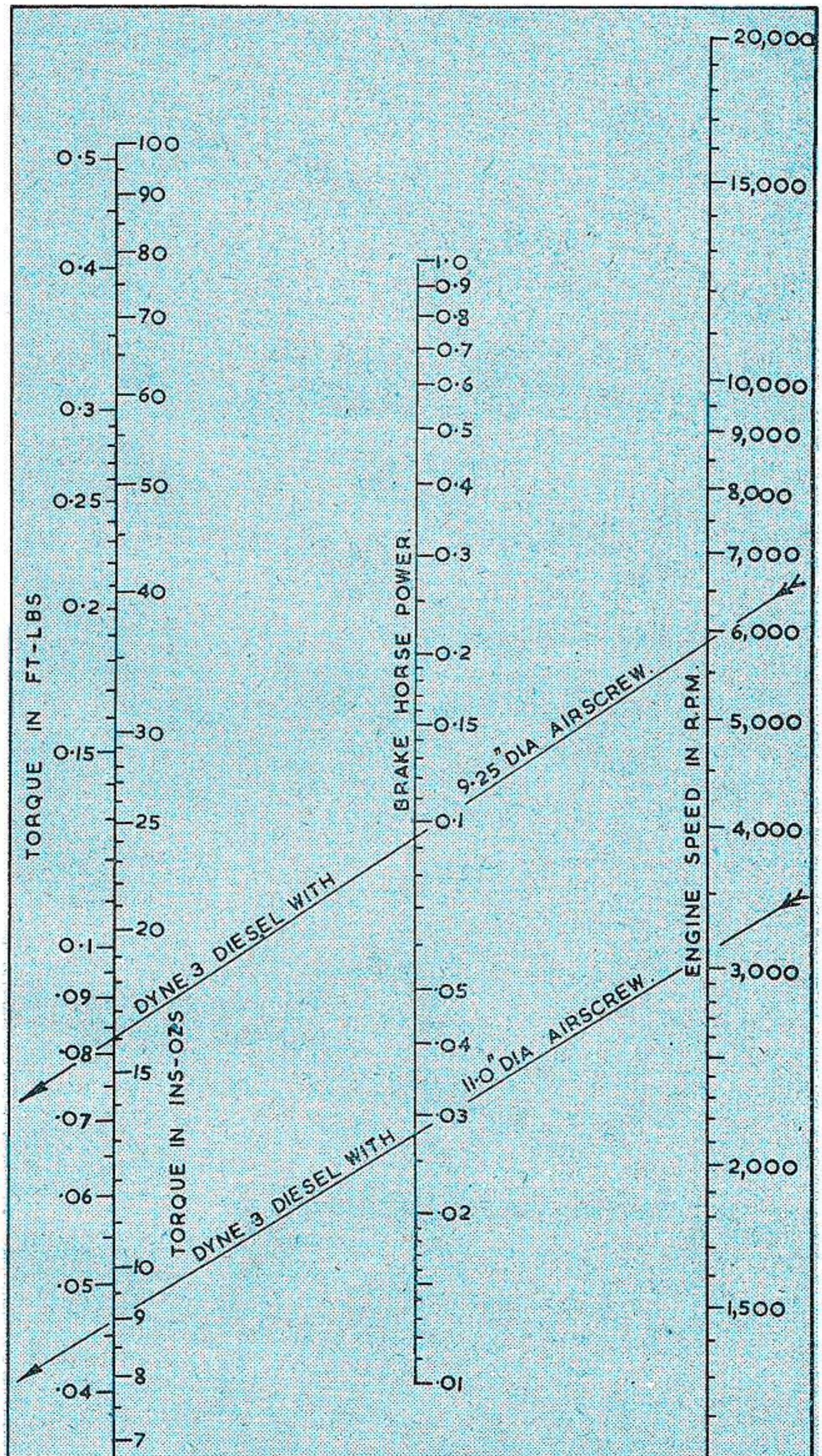
Diameter inches	r.p.m.	engine b.h.p.
9.25	6,500	0.103
11.0	3,400	0.03

Using the nomogram to obtain torque, we see that for the small airscrew it is 15 inch–ozs., while for the large one it is only 8.9 in.–ozs.; in other words the torque is nearly halved by using the large, slow revving airscrew. The snag is of course, that the thrust is also reduced in proportion, and the same effect might easily be obtained by fitting the small one and throttling the engine well back . .

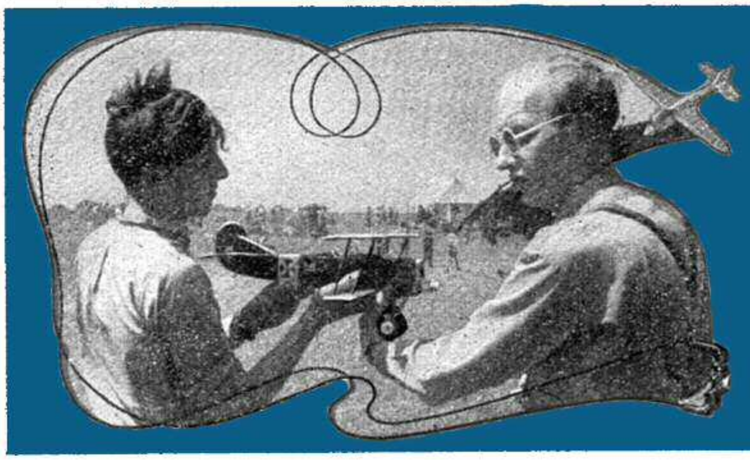
The same principle applies to airscrews of varying pitches. A coarse pitch will give lower r.p.m. and therefor less power can be developed. There is no question of one airscrew needing "more power" than another; it merely revs up till the airscrew torque or resistance to rotation is equal to the torque exerted by the engine. And the airscrew torque varies with r.p.m., and indirectly with various factors such as pitch, cleanness of design, finish, etc.

So we may summarise all this by saying that for a given thrust, torque cannot be varied to any useful extent.

In any case, and always excepting scale models, torque control should never assume serious proportions for the modern aeromod.



NOMOGRAM FOR ENGINE B.H.P.



Control line Commentary

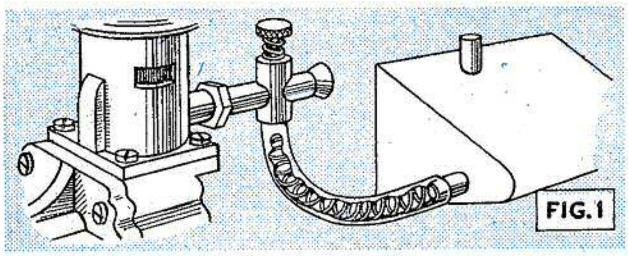


FIG. 1

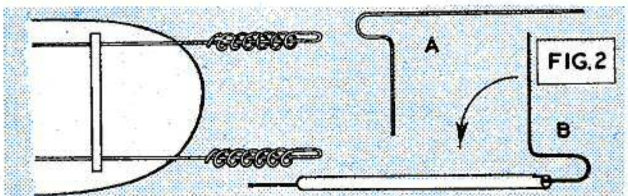


FIG. 2

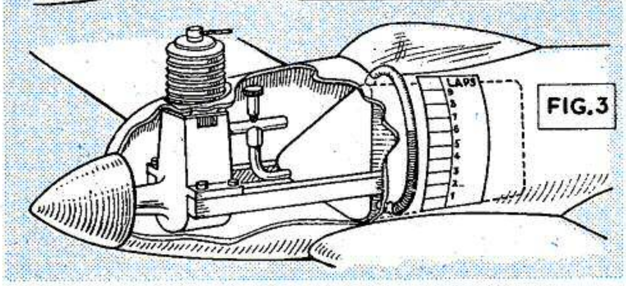


FIG. 3

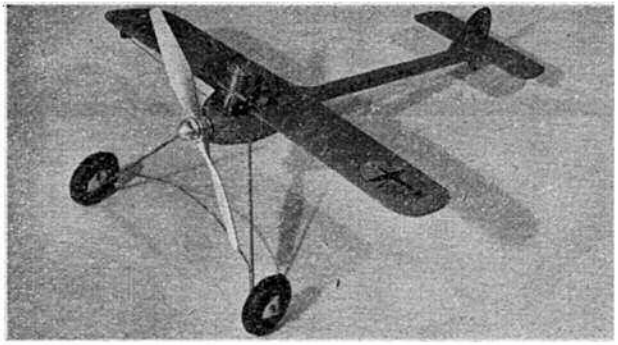
TO make a change from the exhortations of the experts, we give over our Control Line Commentary pages to our readers, and let the experts here digest some of the many practical dodges and gadgets in use by the ever increasing numbers of ardent control line enthusiasts. For those who regard this branch of the sport as crass foolishness, the "brick on the end of a piece of string" contingent, let us say this. Control line opponents are divided into two schools—those that won't and those that can't. Generally the latter form a considerable portion of the former! There's room, plenty of it, for every branch of aeromodelling—but if you think real control line so very easy, why not be childish with us and come and try it? You'll be surprised and if you're fair minded, even impressed. No one who has never held a bucking stunter on the end of sixty feet of writhing line in half a gale can possibly realise the skill and tremendous application needed to become even moderately proficient. It's not unendurably hard—but it demands much patience and not a little fortitude in the face of prang after prang. But there's no feeling like the first successful up, round, over and down—sixteen laps and land intact! The Gold Trophy must be just around the corner!

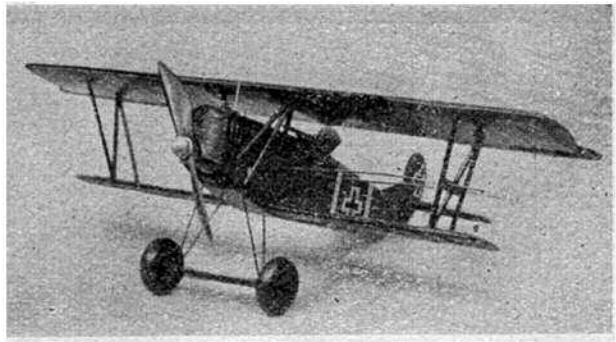
That's a happy day—but here in this article is encouragement to those who have not yet achieved it. Deliberately we have not gone too expert conscious. Rather are we just fifteen feet up on circuits and bumps, news and notes on what many a modeller is circulating happily on his own particular patch.

Our heading photo shows a snap from the British Nationals this year. Owner of this attractive little 24 inch span Fokker DVII control liner is modeller on right, R. Stamp of Northampton. Powered by an E.D. Mark II which is very neatly cowled in by the fuselage, the model is built-up entirely from sheet balsa. Though not capable of advanced manœuvres we gather it is quite happy with the ordinary routine and must present a very pretty picture in flight.

At the bottom of the page is illustrated a 15 in. speed model with "dolly" undercart designed and built by B. Hennessy of Margate. It is powered by a 2·68 c.c. "Comet" diesel of Swedish origin, which is mounted sidewinder style in the port wing, faired in completely except for the head and fins. It is interesting to note that the engine is mounted with the pot pointing inwards to the flight circle instead of outwards as is usually the case. However, this does not appear to give any feeding difficulties as so far a speed of 72 m.p.h. is claimed and 90 m.p.h. is the target after modification. Here's wishing him luck (did some unkind person say he'll need it ?).

To schemes and schemers and to Fig. 1, which shows E. J. Taylor's solution to kinking fuel tubing. Everyone knows this annoying liability of plastic fuel tubing but it can be cured most satisfactorily by inserting a thin spiral spring inside the whole length of the tubing. This thin spiral spring can be bought in foot lengths from jewellery material dealers or even a kindly jeweller—for instance E.D. Mark III tubing requires a No. 3 "Broneel" spring—used for respringing watch bracelets. Size 2 will fit smaller diameter tubing. The only trouble as Mr. Taylor amusingly points out, is that you





may get the fuel twisted . . .

Slipped wires, another often disastrous trouble can be entirely prevented by A. J. Breans' simple but clever method of " cork-screwing " the control rod ends. The only tools are a piece of brass tubing, slotted at one end, and a pair of pliers, and Fig. 2 shows how it's done.

Metal tanks are necessary for hot fuels, but their main disadvantage is their opacity—you never know they're nearly empty till the engine stops or won't start. To prevent this, D. Clarke recommends the addition shown in Fig. 3. Two angle tubes and a piece of interconnecting transparent plastic tubing. An added advantage is that the plastic tubing can easily be run outside the fuselage for greater visibility.

Back to our photos—the two at the top are of models by J. M. Conway-Jones and D. J. Evans. The left hand effort is by the former modeller—it is a sport job, E.D. Mark II powered, with an 18 in. span and a 19 in. fuselage resulting as can be seen in a very long moment arm. Naturally, as the designer says, control is therefore not very sensitive, although it has a fair turn of speed. The model is solid balsa, with the rear fuselage a balsa tube—which has been shortened a little since the photo was taken!

On the right is D. Evans' version of that favourite control line prototype the Fokker D.7. This one is powered with a Foursome 1·2 c.c. and he also uses it for stunting.

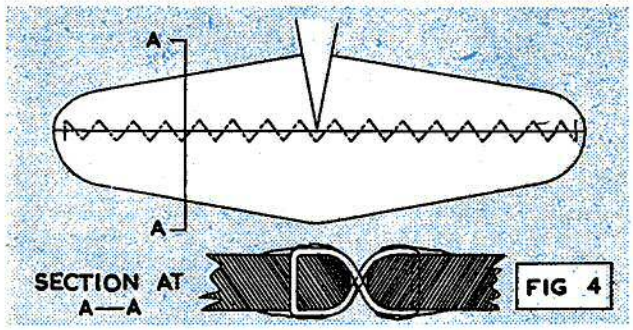
Now for an idea from A. V. Coles of Bristol, for hinging elevators on light stunt and sport models. He claims that this system gives better support, being distributed all along the tailplane span, and on his own model has lasted over two months of consistent flying with no sign of wear. Fig. 4 gives the lowdown—just stitch the elevator on with double white cotton, using a kind of figure eight pattern stitch as shown. It's worth trying anyway.

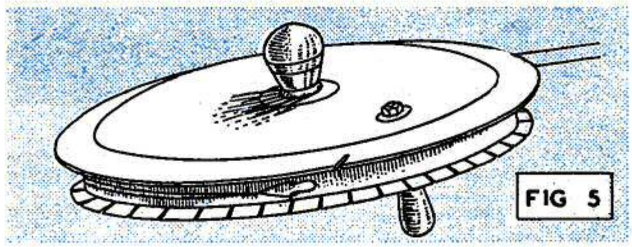
G. Higgins of Bradford invites you to risk domestic upheaval and wind your control wires on a saucepan lid, maltreated as shown in Fig. 5. The flange is notched and folded up and a retaining hook is cut and bent, the knob is shifted to make a winding handle, and a larger handle is fitted in the centre such as a file or chisel handle.

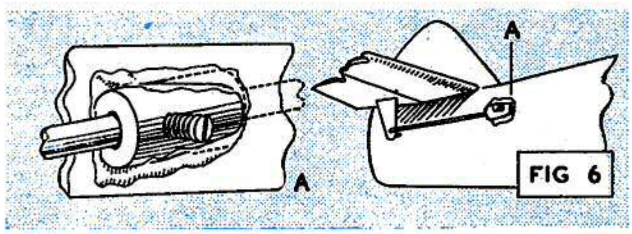
Lastly a very neat suggestion from H. C. Skeels of Warrington, for anybody who flies a goat. And in case there is somewhere a mystified tyro a " goat " is a converted or convertible free flight model. The great trouble with a goat is that you may wish to reconvert it back to a normal sensible flying machine. Now Mr. Skeels advises an ordinary small transformer terminal connection—cut in half, use either half—mount it in the fuselage as in Fig. 6 with the elevator operating rod passing through it. Then the elevator can easily be locked for free flight in any position by a couple of turns with a screwdriver, and as easily unlocked for control line flying.

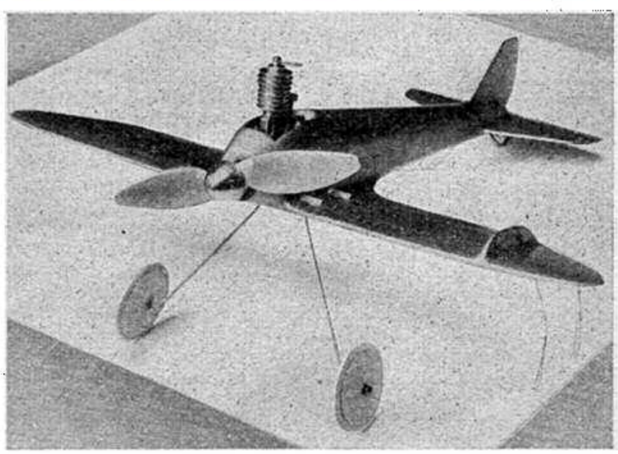
Our final photo comes from R. A. Fisk of Pinner and shows his baby 16 in. span model powered by a baby Aeromodeller ·8 c.c. diesel. All up weight is 6¼ ozs. with all balsa construction and it does 35 m.p.h. on 30 ft. lines.

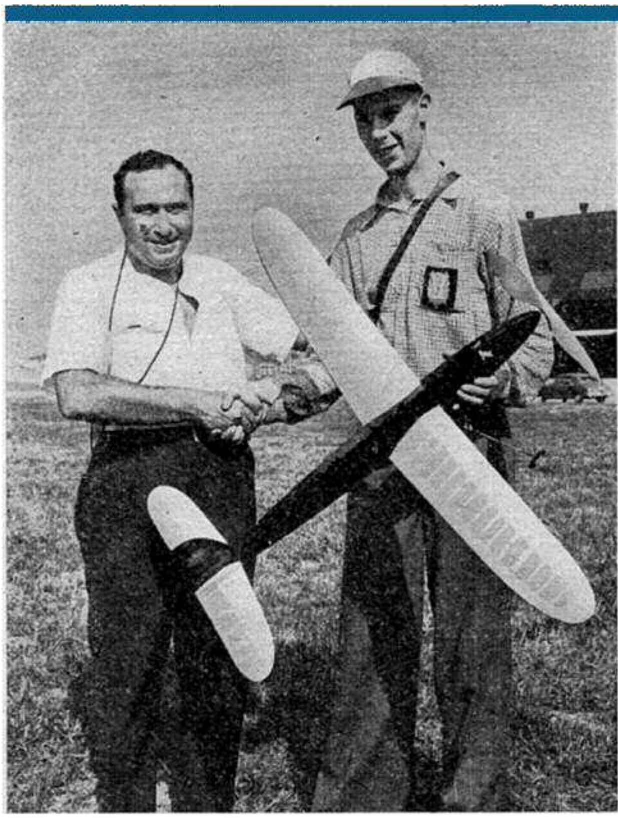
That's the batch for this month, but there's plenty more on the way. Good circulation!











Irwin Polk congratulating Roy Chesterton. We imagine Roy is holding his spare model as he lost his original on its last flight!

(*Continued from page 17.*)
ways would cause a great deal of consternation; . . . and in all probability be prosecuted for obstruction.

The fact that cars *and* petrol are plentiful and that Americans think nothing of travelling 400–500 miles a day, results in a tremendous amount of "coming and going". All along the main highways are roadhouses, snack bars, "help yourself" cafes, and "Diners" all of which are open 24 hours a day, seven days a week, "they never close" as Vivian Van Damm would say. At these wayside stopping places one can obtain anything from a sandwich to a full meal, the choice of 30 different ice creams, and an even larger number of soft drinks.

"Motels" are of course a feature of life in America along the roads. These consist of sites on which are erected small bungalows against which a traveller may park his car and in which he can spend a night. Camping sites on which large caravans, some of 25 or even 30 ft. length, are quite common. The caravans are packed in rows to which are attached connections from which main water and electricity supplies can be obtained.

At the Wakefield Contest we met Mr. and Mrs. H. V. Bentley, late of the Blackpool Club, who emigrated to America about a year ago. They told us that they lived in a large caravan, and when they felt like a change they would pack up and move to another site for a change of scenery.

Another feature of American life is the outdoor cinema. There are several hundred of these "cinemas" all over America and they are erected a few miles outside the large towns. The "cinema" consists of a screen about 30 ft. wide by 20 ft. deep mounted about 25 ft. above the ground. In front of the screen are arranged in serried rows, upright posts from each of which descends on a length of flexible cable, a small loudspeaker.

The cinema is, of course, operated in the evening, the patrons drive their cars straight up to the rows of posts. All cars are parked on the same side of the rows of posts, the loudspeakers (complete with volume control) being hung inside the roof of the car.

The positioning and "staggering" of the posts are such that all the cars face the screen and are so arranged that viewers in the front seats can see between or over the roofs of adjacent cars.

We were informed that the majority of the patrons were courting couples and parents with young families whom they could stow in the back of the car. Of course—as a matter of course the inevitable ices, drinks, and hot dogs and so on were available during performances and one enterprising cinema proprietor even offered "we wash your laundry while you see the film".

American motor cycles must be seen to be believed. The Harley-Davidson seems to be the most prominent type, twin head lamps—in fact everything is duplicated. Much chromium plating, a large padded seat for the driver, and an even larger padded seat for a lady passenger. Hanging from either side of the passenger seat are huge leather pannier bags decorated with many chromium studs. The whole impression, whilst not exactly gaudy, suggests an ideal mount for a typical Red Indian, complete with tomahawk, feather headdress and so on.

As for New York itself, I was most pleasantly surprised. It is very much cleaner than London, due no doubt to the complete absence of steam trains from the Centre of the city, and what must surely be an excellent system of carburation on all the cars in the city. (Possibly the height of the buildings help to create thermal up-drafts.) Be that as it may, the fact remains that one can go out shopping in and about the streets of New York and come back to one's hotel in the evening, far cleaner and far more rested than ever one can in London.

New York Policemen are generally as portrayed in American films. They are complete with revolver, cartridges, handcuffs (hanging by a chain from the inevitable leather waist belt), jauntily arranged cap; and control traffic by whistles and a "system" of arm waving which is rather reminiscent of a windmill in a small gale. Traffic moves en masse in a much more orderly manner than I had anticipated. Whilst clearances between adjacent moving cars are admittedly reduced to a minimum, for all that, I never once saw a case of dangerous driving, an accident, or even a dented mudguard. I did, of course, hear much conversation generally between policemen and pedestrians, taxidrivers and themselves and/or pedestrians, but then freedom of speech is, of course, one of the "rights" for which the American will fight for.

Owing to the very hot weather we subsisted mainly on a vegetarian diet, fresh fruit, fish, salads etc. and ate very little meat, although, of course, the much advertised 1 lb. steaks were there to be had by those who chose (or could) eat them. The fact has been widely published in this country that American publishers consume about 100 times the weight of paper that their contemporaries do in this country. I should say that the American restaurant proprietors consume at about the same rate when printing their menu cards. That offered by Billy Rose at the Diamond Horseshoe Restuarant (one to each customer!) measured 22 by 17 ins. and was multi-colour printed on stiff card!

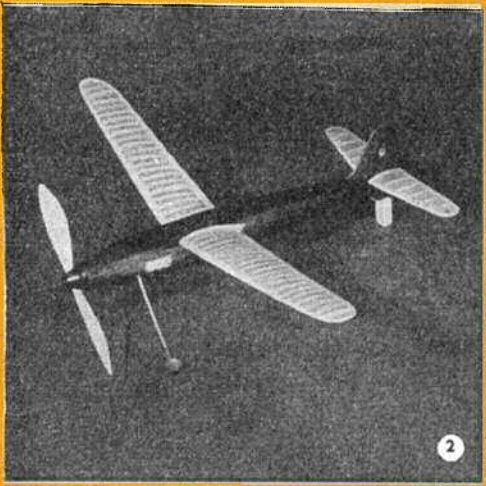
. . . . And would I like to live in America? Perhaps, rather inevitably, the answer is 'Yes and No'. But to give the various reasons would require more space than I can allocate, and so this report must close with my renewed appreciation of all that our American friends and hosts did for Mr. Rushbrook and myself during our stay over there.

To all of them we send an invitation to visit England for the Wakefield contest of next year, and so give us the opportunity of showing them the many beauties and amenities of *our* country.

1948 WAKEFIELD ALBUM

A REVIEW OF THE CONTESTANTS AND THEIR MODELS THAT PARTICIPATED IN THIS YEAR'S MAIN INTERNATIONAL EVENT

1. R. B. CHESTERTON (1st) of Northampton M.A.C.
23 year old Aeronautical student.
Top man in the English Trials in spite of extremely bad weather with an average of 2 : 35·0·8
Showed fine appreciation of conditions at the Finals, with progressively better times of 4 : 46·5, 6 : 02·4, and 8 : 32·9.
Average :— 6 : 27·3.

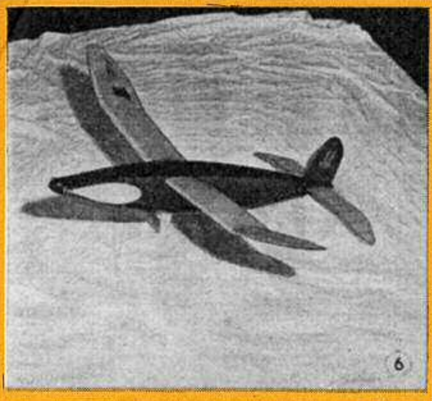


2. R. ("BOB") COPLAND (6th) of Northern Heights.
30 years of age, and probably best known British modeller, fourth time Team member.
Model was the well-known streamline type used successfully for some years. Believes in concentration on a known design, improving in detail and flying technique by constant practice.
Times :— 4 : 09·3, 3 : 08·3 and 2 : 31·9.
Average :— 3 : 16·5

3. A. D. PIGGOTT (18th) of Croydon M.A.C.
26 year old F/Lt. in the R.A.F.
Winner of the 1948 Lady Shelley Cup (seaplanes), has had many successes in National competitions.
Model is a straightforward slabsider with parasol mounted polyhedral wing. Retracting undercart and two-bladed folding prop, with dethermaliser housed under belly of machine.
Times :— 0 : 10·3, 2 : 00·7 and 3 : 16·7.
Average :— 1 : 49·2.

4. P. C. ("CHUCK") DOUGHTY (20th) of Birmingham M.A.C.
32 year old Midlander, has good knowledge of bad weather flying, but could not get going at the Finals. Model is a straightforward type, slabsider highwing, with parallel chord.
Times :— 1 : 54·9, 1 : 16·9 and 1 : 29·8.
Average :— 1 : 33·9.

5. LEN STOTT (19th) of Bradford M.A.C.
43 years of age, was appointed Team Captain. Third time of making the British Team, flew his well known "Flying Minutes" design with less than usual success.
Times :— 1 : 30·6, 1 : 17·2, and 2 : 33.
Average :— 1 : 46·39.



6. M. A. KING (21st) of West Essex.
19 years old and 'baby' of the team. Lost his model at the Trials, and built a new design in spite of induction into the R.A.F. for initial training. Owing to circumstances model not fully tested, and trouble experienced on first two flights, probably owing to heat warps.
Times :—0 : 43·2, 0[: 43·6 and 3 : 12·4.
Average :—1 : 33.

7. BOB HOLLAND (3rd) of Sunland, California, U.S.A.
33 years of age, placed top man at the 1948 American Nationals.
Model was a beautifully constructed highwing cabin type, using polyhedral on mainplane and two bladed folding prop. With all-red colouring, the machine was one of the best looking models at the contest.
Times :—2 : 03·2, 6 : 34·2 and 4 : 51·5.
Average :—4 : 29·7.

8. TOM CORYHILL (4th) of Indianapolis, Indiana, U.S.A.
Top man in the American Wakefield team eliminator. Model was an "extreme" slabsider, with extra large cross section at rear end, presumably for rubber space. High wing with polyhedral tips, single wheel undercart and single blader folding prop. Wide span tailplane with three fins.
Times :—3 : 28, 7 : 37·2 and 1 : 42·8.
Average :—4 : 16.

9. JAMES ("JIM") CAHILL (7th) of Connersville, Indiana, U.S.A.
Winner of the 1938 event at Guyencourt, France. Model was probably the most unorthodox at the Contest. Wide, airfoil section fuselage mounted assymmetrical, polyhedral mainplane and end finned tailplane. More area on port side of fuselage, also port fin was larger than starboard. Model had great possibilities, and was the only entry not recovered to make full number of flights.
Times :—1 : 48·5 and 7 : 44·2.
Average :—3 : 10·9.

10. JAMES BUNTON (10th) of Hunington, West Virginia, U.S.A.
Fourth placeman in the American eliminators at Olathe. Model was straightforward slabsider, with shoulder positioning of the polyhedral wing and a single blade folding prop.
Times :—1 : 24·9, 1 : 33 and 5 : 14·2.
Average :—2 : 44.

11. DICK KORDA (13th) of Euclid, Ohio, U.S.A.
Winner of the 1939 contest with one terrific flight, Dick was automatically elected to the American Team by virtue of being holder of the Trophy. Refused to accept his place in this manner, and insisted on flying in the eliminators, gaining third place. Slight alteration in original design caused trimming worries, cured at the last moment by adding to fin area. Model mainly as before, but minus cabin.
Times:—1 : 43·6, 3 : 04 and 1 : 32·7.
Average:—2 : 06·8.

12. RICHARD SCHUMACHER (26th) of Reseda, California, U.S.A.
Placed second in the eliminator, and would have done much better in the finals but for motor troubles. Good workmanship and finish distinguished the model.
Times:—1 : 53·9, 1 : 37·1 and 0 : 09·7.
Average:—1 : 13·6.

13. BOB MILLIGAN (5th) of Toronto, Ontario, Canada.
Well known Canadian modeller, Milligan flew a finely constructed slabsider with high mounted polyhedral multi-spar (Korda type) wing. Two bladed folding prop. completed a typical American class model. Probably suffered least among the Canadians from rubber faults.
Times:—1 : 12·3, 8 : 48·4 and 1 : 16·6.
Average:—3 : 45·8.

14. LEVELLE WALTER (16th) of Windsor, Ontario, Canada.
Captain of the Canadian Team and one of the best known modellers in that country. Very anxious to see modelling interest increase in Canada, and hoping that some of their chaps can get across for the 1949 event. Model again a slabsider, with parasol mounted mainplane, twin fins and two-blade folding prop. Dogged by motor troubles.
Times:—2 :57·4, 1 :28·6 and 1 :22·8.
Average:—1 :56·3.

15. JOHN COTTE (22nd) of Ottawa, Ontario, Canada.
Most unorthodox of the Canadian entries with slabside fuselage, wing and empennage mounted on streamlined runners in a parasol position. Anti-spin fins mounted under tips of tailplane, and two-bladed folding prop. Flat centre section of wing ended in sharply dihedralled outer panels almost on "Banshee" principle.
Times:—1 :16·5, 1 :35 and 1 :33·7.
Average:—1 :28·4.

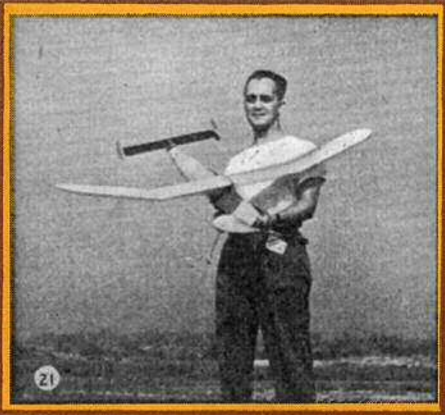
16. ROY NELDER (24th) of Toronto, Ontario, Canada.
Perhaps the best known Canadian this side of the Atlantic owing to reports of his successes in American contests. Flew a model identical with Milligan's but had more motor trouble.
Times:—1 :16, 1 :22·6 and 1 :27·3.
Average:—1 :22.

17. JIM WOOD (25th) of Windsor, Ontario, Canada.
Tall, rawboned fellow, flew one of the few non-cabin type models. Diamond fuselage with sweptback tip wing mounted on a short pylon. Monowheel and twin-finned, noted for the long slim nose to the machine.
Times:—1 : 21·8, 0 :53·6 and 1 :32·8.
Average:—1 :16·1

18. LEONARD DICKIE (28th) of Ottawa, Ontario, Canada.
Flew a diamond fuselaged, parasol wing type model, parallel chord wing being sharply polyhedralled. Twin finned and single blade folding prop. Had more than his share of troubles, and only crammed in poor flights in spite of sterling efforts.
Times:—0 :58·1, 0 :55·2 and 0 : 11·8.
Average:—0 :41·7.

19. GEORGES LIPPENS (8th) of Brussels, Belgium.
Captain of the Belgian contingent and one of the leading lights in aeromodelling in that country. Flew his own designed model, similar to the shoulder wing slabsider power models that have won fame for the Belgians in European events. Long slabside fuselage has parallel chord polyhedral wings let into the sides in shoulder position, location being by means of flat plates instead of the orthodox dowels.
Times:—1 :57·1, 5 :22·1 and 1 :45·8.
Average:—3 :01·7.

20. LUDO VAN HEMELRIJCK (9th) of Brussels, Belgium.
Flew the standard Belgian model, employing diamond fuselage, and all sheet balsa covered high aspect ratio wing mounted in parasol position. Wings were braced with thread, and looked generally unsafe even in calm conditions prevailing at Akron. Not much chance in average English weather.
Times:—1: 03·4, 7 :00·9 and 0 :13·4.
Average:—2 :45·9.



21. GASTON JOOSTENS (12th) of Brussels, Belgium.
Proxy flown by Carl Goldberg of Chicago, this model was again the tandard entry by the Belgian Team. Experienced a lot of motor trouble, and did very well to place so high mainly owing to good hard work.
Times:—2 : 36·2, 2 : 33.6 and 1 : 15·8.
Average:—2 :08·5.

22. EMILE SYSMANS (30th) of Antwerp, Belgium.
A doctor by trade, Sysmans is fairly well known to international competitors in England. Flying the standard machine, he had the toughest luck of the Belgian entries, getting two "no flights" at the outset, and retired. Motor troubles again caused the major difficulties.

23. I. FROST (14th) of Goulburn, Australia.
Frank Cummings, 1947 American National Champion, flew proxy for Frost, and earned the admiration of all by the hard work he put in despite all difficulties. With broken motors wiping off the front of the fuselage on each flight, the model was rebuilt five times in order to get in the required three official flights. The relative high placing is solely due to the proxy work put in by Cummings, who was generally voted a "fine type" by the British contingent.
Times:—3 : 26·2, 0 : 58·4 and 1 : 47·3.
Average:—2 : 04.

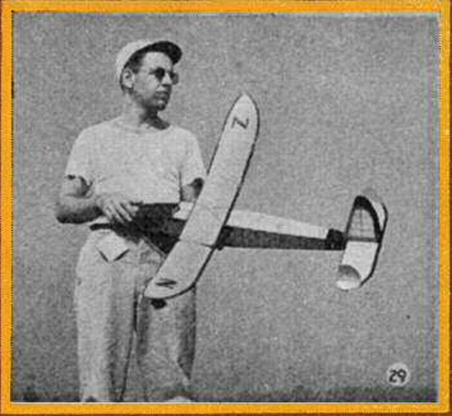
24. BILL MARDEN (29th) of Sidney, Australia.
Proxy flown by Don Donahue of Los Angeles, this model was a replica of the Grant "Tse-Tse Fly", produced in Model Airplane News before the war. Rubber breakage wiped out any chance the model had, as the three flight times show.
Times:—0 : 14, 0 : 09·8 and 0 : 43·9.
Average:—0 : 22·6.

25. B. B. MARSH (2nd) of New Zealand.
Flown by Otto Curth of Chicago, the model employed a streamlined fuselage, on which the slightly polyhedralled wing was mounted on a short pylon. Monowheel, single blade folder and underslung tailfins complete the details of this model. Sandwiched between two average flights, this model put up best individual flight in the contest.
Times:—2 : 58·2, 12 : 11·1 and 2 : 28·3.
Average:—5 : 52·5.

26. ANGUS MCDONALD (15th) of New Zealand.
Proxy flier Jim Broderick of Chicago flew this high winged slabsider, fitted with twin blade folder and triple fins. As with all the New Zealand entries, the wing tips were upswept.
Times:—2 : 47·9, 1 : 43·8 and 1 : 20·7.
Average:—1 : 57·5.

27. H. S. WOODLEY (17th) of New Zealand.
Alvin Fritz was proxy flier for Woodley's model, this being the most "American" example in the N.Z. team. Cabin type slabsider had a polyhedral wing mounted on top, general lines being very "Korda-ish".
Times:—2 : 05·6, 2 : 05·6 and 1 : 20·1.
Average:—1 : 50·4.

28. E. H. HAROLD (23rd) of New Zealand.
Proxy flown by Gerald Ritzenthaler of Chicago, this entry came in as N.Z. reserve owing to Hewitson's entry being rendered hors de combat. With a streamlined fuselage on somewhat "Clodhopper" lines, the wing was parasol mounted, and a single bladed folding prop. used.
Times:—1 : 16·3, 0 : 55·6 and 1 : 58·9
Average:—1 : 23·5.



29. VERNON GREY (27th) of New Zealand.
Probably the best known New Zealander here owing to his consistent entry into international events such as the Wakefield and Moffet in pre-war times. Grey's model, flown by Wally Fromm, was an orthodox slabsider with high mounted polyhedral wing, and employing triple fins.
Times:—1 : 13·6, 1 : 21·6 and 0 17·3.
Average:—0 : 57·5.

AIRCRAFT DESCRIBED No. 14

THE SOPWITH PUP

BY E J RIDING

THE Pup was sent into squadron service in May, 1916, at a time when the R.F.C. and R.N.A.S. were pitting their strength against the new Fokker monoplanes, and together with the D.H.2, it helped stem the tide until even better equipment arrived to carry the war into the enemy's camp.

Although it was on the training aerodromes that the Pup became better known, they were used on Home Defence duties against the Zeppelins and a Pup was the first aeroplane to be flown from and landed on a ship at sea.

About 1,300 Sopwith Pups were built, and they were issued to Nos. 3, 4, 8, 9, and 13 Naval Squadrons, Nos. 46, 54 and 66 Squadrons R.F.C., and No. 61 Home Defence Squadron.

In 1919, Sopwiths, who were producing new designs for the civil market decided that the Pup airframe, suitably modified to take two persons, would make a very satisfactory sporting machine. Consequently, a batch of eighteen Doves, as the new machines were called, were laid down at the Kingston works, some of them being registered G–EACM, G–EACU, G–EAFI, G–EAGA, G–EAHP, G–EAJI and J, G–EAKH and G–EAKT. With the exception of the first named, they were all sold abroad within a few months of registration.

For some reason or other, G–EBKY, the last of the batch, was not registered until March 1925, its first owner being D. L. Hollis-Williams, who later sold it to the late C. H. Lowe-Wylde of glider fame, after a crash on the old Ensbury Park aerodrome at Bournemouth in April, 1927 due to the engine cowling coming adrift in flight.

Lowe-Wylde took the pieces away to West Malling, where he was building the first B.A.C. "Drone" ultra light aeroplane, repaired it, and flew it regularly until his death in 1933.

After a year or so of obscurity 'KY then owned by G. A. Chamberlain of Hayes, passed into the hands of its present owners in July, 1937.

Warden Aviation, Ltd., who specialise in the restoration of historical aircraft, took the Dove apart, and with the help of an original Sopwith blue-print converted it into the replica of a wartime Pup that it is to-day—an operation that was helped considerably by the fact that unlike the other Doves, 'KY was without the characteristic swept-back wings of the type.

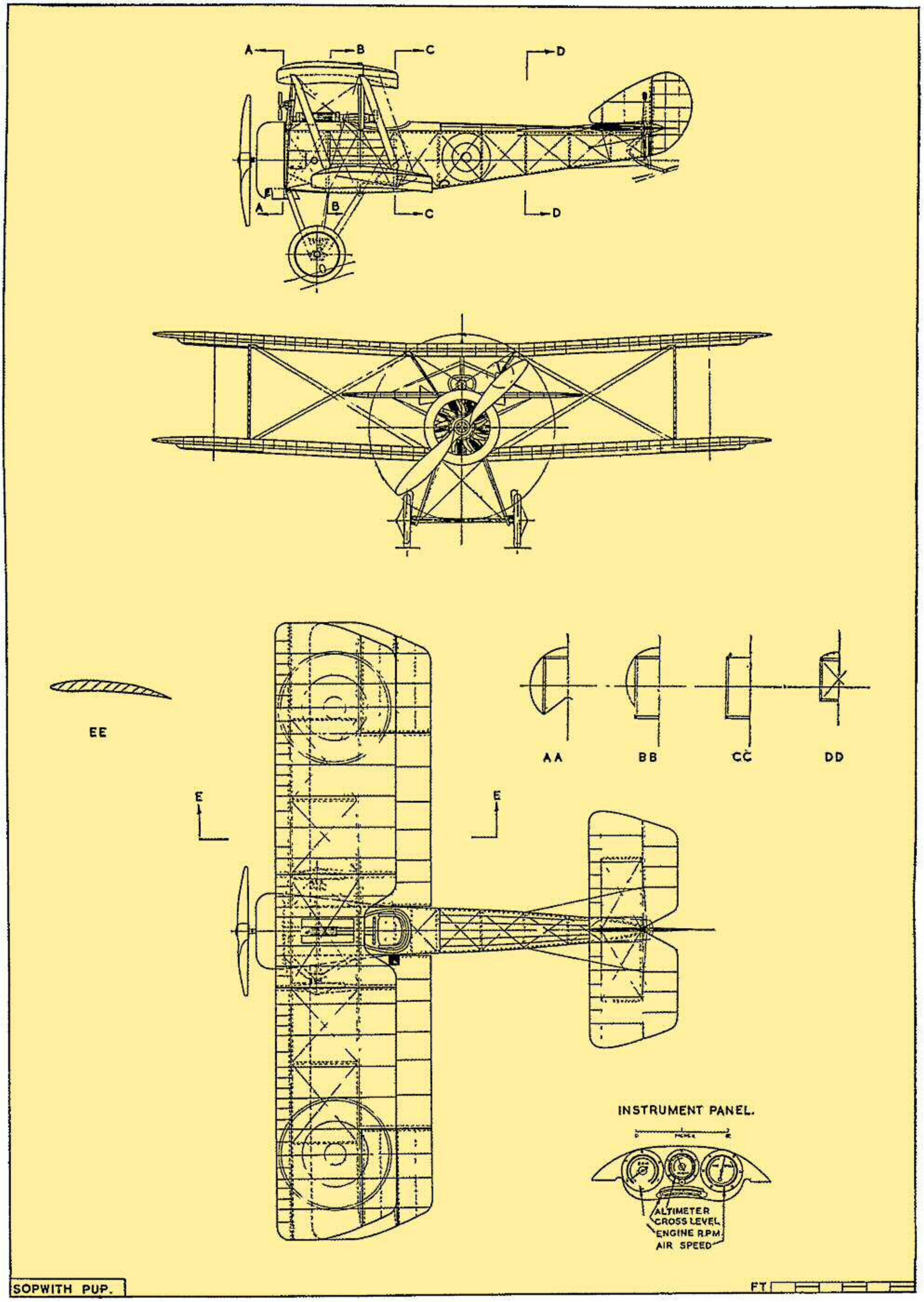
Since the late war, 'KY has been flown at various air meetings up and down the country by W/Cmdr. A. H. Wheeler.

Externally, the only differences between the Shuttleworth Pup and the real thing are as follows:—The rear centre-section struts are made from streamlined steel tube instead of spruce, the interplane struts have a slightly tapered shape in side elevation instead of being of uniform width, and the under surfaces of the wings and fuselage have been painted khaki-green instead of being clear-doped.

Construction : Fuselage : Spruce longerons and cross members with tensioned wire bracing and fabric covering. **Wings :** Spruce spars and ribs with fabric covering. **Undercarriage :** streamlined steel tubular Vees, with usual Sopwith pattern divided axle sprung with rubber shock cord. **Power :** One nine-cylinder air-cooled rotary 80 h.p. Le Rhone.

Colour : Standard camouflage scheme of the period as shown in Mr. Moore's cover painting. Typical service serial numbers : A.6214, (R.F.C.) or N.5180, (R.N.A.S.) painted on fuselage aft of the roundel and near the leading edge of the tailplane.

Aeromodeller Photos.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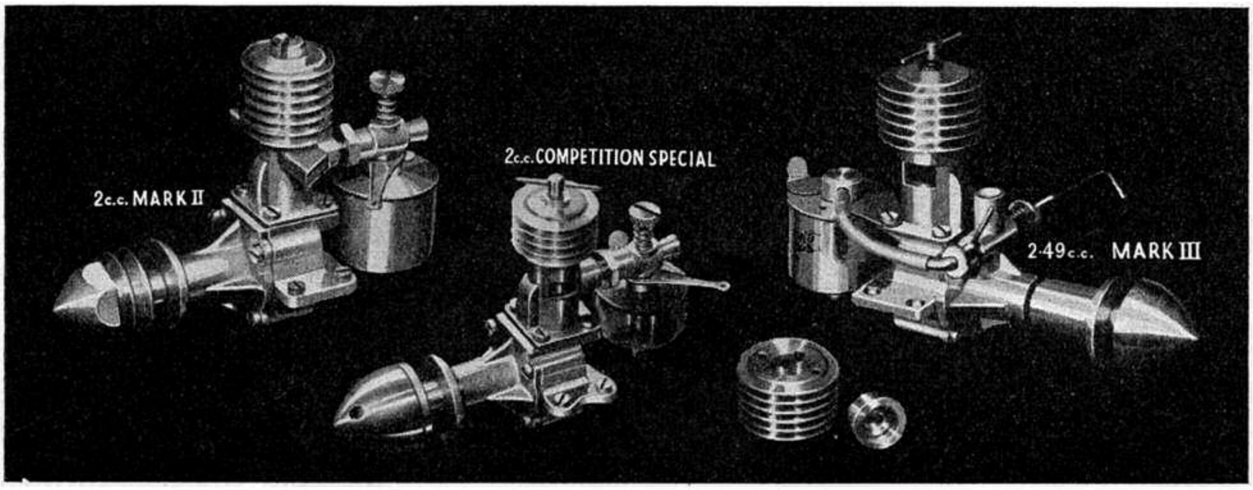
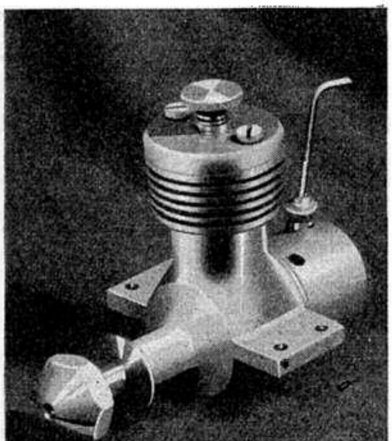
SOPWITH PUP.

E.D. DIESELS



EVERY ENGINE A THOROUGHBRED!



E.D. (BEE) 1 C.C. MARK I.

Keil Kraft's latest cabin model, the "Pirate," has been specially designed for the above engine.

The following Kits are ideal for the E.D. 2 c.c. COMPETITION SPECIAL: Keil Kraft "Slicker" 50 in. span; "Outlaw" 50 in. span; "Scout" (C/L) 20 in. span; "Skyleader"; "Kan-doo"; "Thunderbird"; "Zipper"; "Mercury Magnette"; "Mercury Vitesse"; Drome "Club" Models; Normans Model Kit, etc., etc.

E.D. Diesels have set a standard of quality and performance which we believe has never been equalled.
No model is put on the market until we are absolutely certain that it is the best of its class and that this extremely high standard has been maintained. The outstanding successes of E.D. Diesels in competitions against all comers provide positive proof that you cannot do better than choose an E.D.

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The Engine on which the E.D. reputation for first-class quality was built.. .. .. .. PRICE **£3.10.0**

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Record Holder 89·95 m.p.h. control line flying. PRICE **£3.17.6**

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Record Holder "C" Cars 41·7 m.p.h. PRICE **£4.5.0**

Exhaustive tests of the E.D. Radio Control Unit show that once again we have produced a winner. Send for details .. .. PRICE **£14.10.0**

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CLUB NEWS
by Clubman

An imposing array of models and members, not to mention contented smiles, of the Rotherham and District M.F.C. at a recent competition.

ONCE again, this being the Christmas issue, I must fall into line with the distribution of good cheer and Christmas greetings, in spite of the fact that it is only October as I write this! However, a suitable atmosphere has been lent to the occasion by the first really heavy frost of the year, so it does not seem quite so early as is usually the case.

Details are given this month of the final contests in the 1948 national programme and it is very pleasing to record our hearty congratulations to Mrs. M. Eves of the Upton M.F.C., for showing the way home to the mere males in both the S.M.A.E. Cup and Women's Contest. Her success in the latter event is quite notable as she was up against such doughty Amazons as Mrs. Buckeridge, Mrs. Dillon and Mrs. Stothers. However, her success here is far outweighed by the manner in which she cleaned up the S.M.A.E. Cup from an entry of 235 competitors which included the usual top grade contest men. Let us hope her example will be a spur to other lady members to try their luck against the too numerous male competitors.

The 1949 contest programme (which we give in full in next month's issue), has been slightly streamlined, particularly with regard to the Nationals where one event only will be held for each of the main modelling sections. The most interesting innovation will be the introduction of a radio control event. It was deemed advisable to include this in the Nationals programme in order to allow of its widest introduction to the aeromodelling public.

Naturally, full attention focusses on the Wakefield Trophy event which will take place at the August Bank Holiday weekend, but I presume at this stage far more interest will be shown in the method of selecting the British team. A great deal of controversy has raged since last year's trials, when certain sure-fire favourites were eliminated through their own efficiency. However, full cognisance has been taken of the fact that the newly introduced system of a double eliminator was largely discounted by freak weather conditions. In view of the fact that the 1948 method met with such general approval, the system is again retained for 1949 with the proviso that in the event of a model being lost or hopelessly damaged during the contest a reserve model may be used to complete the required three flights at the discretion of the judges. I foresee even greater competition for next year's events on May 15th and July 2nd and trust we shall be able to pick a tiptop team without any repercussions as happened in 1948.

Two further revolutionary breakaways from tradition are shown in the application of a " rain date " for the Wakefield Trials, allowing postponement from the Saturday to the Sunday if conditions prove impossible on July 2nd; and the division of the " power " meeting on September 25th into North and South sections. In the event of conditions being impossible on July 2nd it will obviously be far easier for long distance travellers to put up for the night than have to find the time and fares if postponed to another weekend.

The second innovation will, I am sure, bring universal approval as being the first time that a centralised event has been treated in this manner, and should go a long way to discounting the old grumble that " all such events take place in London." The other centralised events in the programme, i.e., Nationals, Wakefield Trials and Wakefield Finals, obviously cannot be treated in this manner, but I am certain the provincial modellers will be highly satisfied with a programme which gives them five fully de-centralised dates, three Area affairs and now this additional North-South bi-centralised event.

One other very interesting new rule is to the effect that in the event of there being less than ten entries in a national contest (with the exception of the new radio control event), the contest will be declared null and void. Very obviously the day has passed when a National event can be held which is supported by only three or four competitors, a happening which has caused a great deal of heart-burning in many quarters in the past.

An extremely interesting departure from normal practice is the introduction of the five minute rule into the Wakefield Trophy Finals. In the event of two or more competitors tying with the maximum of three 5-minute flights, a fly-off will be arranged in which no time limit will be imposed. This will, in my opinion, go a long way towards placing the award with the really skilful rather than the lucky flier, as I am sure we are all fully aware of the fact that the thermal is not always found by the best man. It is interesting to note from this year's Wakefield results that had the five minute limit been in operation the final results would have been as follows:

	Average
Chesterton	4:55·5
Holland	3:58·2
Marsh	3:28·8
Coryell	3:23·5
Copland	3:16·5
Milligan	2:29·6

(Incidentally, how many of you had tumbled to the fact that with the exception of Chesterton all our fellows got better

S.M.A.E. CONTEST RESULTS

S.M.A.E. CUP

1	Eves, Mrs. M.	Upton	786
2	Reynolds, S.	Upton	750·8
3	Green, A. W.	West Essex	642
4	Yeabsley, R.	Croydon	601·9
5	McKenna J.	Park M.A.L.	543
6	Dawes, C.	Ravensbourne	528·6
7	Harvey, J. K.	Gillingham	515·3
8	Denyer, E.	Croydon	490·2
9	Kreeger	Brentford	488·7
10	Butler, D.	Surbiton	483·5
11	Fairgreave, I.	Derby	475
12	Posner, D.	Kingsbury	474·5

(235 competitors)

WOMEN'S CONTEST

1	Eves, Mrs. M.	Upton	491
2	Knight, Mrs. D.	North Kent	286·3
3	Lapsley, Miss D.	Upton	230·4
4	Buckeridge, Mrs. A.	Pharos	200·2
5	Dillon, Mrs. E.	Liverpool	194·1
6	Whistler, Mrs. E.	Crystal Palace	117·6
7	Clements, Mrs. L.	Luton	107·5
8	Garnett, Mrs. M.	Bristol and W.	90·2
9	Bell, Miss S. N.	Huddersfield	88
10	Cusach, Mrs. J.	Plymouth	·87·7
11	Crute, Mrs. B.	Torbay	77
12	Stothers, Mrs. J.	Leicester	69

(16 competitors)

averages at the Trials than they did at Akron, and this in spite of the totally different weather experienced at both places !).

I am indebted to reader W. H. Sharp of Woodford Green, for the following reproduction of flying instructions from a model plan put out by a Japanese manufacturer :

" After the model is completely assembled, eye it up, to see that the plane is square with fuselage, and this model plane, at first, give the propeller about 200 turns with a winder and let fly, then if it will fly high about 25 feet at a level until get loose of all rubber-motor, the stability will be most well.

" Next gives the propeller turns about it is possible (the full amount 450 turns), it will fly at a level rising high up about 56 feet. If it come down at only a few flying, it will be owing to a little of the rubber motor.

" If the plane nose down to the ground, it is due to weight forward of the plane, so that advance the main plane a little forward to propeller or the landing gear fasten a few backward to the main plane, and also in case upwards the nose quickly, at this plane, at a position of rear (d) of the stabiliser, mostly should be when became too upward owing to heavy stretched with thread (14) of the rudder.

" In other case, reform in the opposite direction with when became downwards and would be best to regulate of the stability."

A rally, organised by the **ISLAND BRANCH** of the Air League of the British Empire on Cowes Airport proved of great interest to the local modellers. Four events were held, the power class going to V. Woodward with an aggregate of 3 : 58 ; R. Thomas took honours in the rubber class with a total of 2 : 49 ; and the sailplane event went to E. Heber with 1 : 11·5. P. Knowles won the C/L contest against keen competition.

The first annual contest day of the **CHICHESTER & D.M.A.C.** was held at Tangmere Aerodrome on August 22nd with the following results :—

Rubber :	P. Upton	2 : 26·5
	P. Penfold	2 : 02
Glider :	R. L. Lucas	7 : 14 o.o.s.
	G. Roberts	6 : 14
	R. F. Boxall	3 : 04
Control Line :	W. Honeybourne	352 points
	R. F. Boxall	248 ,,
	R. A. C. Polhill	223 ,,

R.A.F. WITTERING put on a good model show in conjunction with the Station "Battle of Britain" affair, both cars and model aircraft taking their share of the credit. A static display was bolstered by demonstration C/L (including jet) flying, and a total of some £63 was collected for admission to the large hangar.

A jump of over 30 m.p.h. is announced in the club speed C/L record from the **EASTLEIGH & D.M.C.**, this being one of the highlights in the club magazine, "Model Torque" which is now complete with New Look.

Radio Control is coming in for a lot of attention in the **BUSHY PARK M.F.C.**, Ted Hemsley already trying out his equipment in a boat prior to plane installation. Mike Smith is building an 8 ft. span glider which will also carry radio equipment. In spite of all this activity, the other branches of free and controlled flight are not being neglected, Mick Guest having at least learnt how to bunt a model without wrecking it ! Gus Gunter's Arden powered "Banshee" is still missing, and any news will be welcomed.

The finder of a model glider belonging to R. A. Twomey of the **AMPLEFORTH COLLEGE M.A.C.** got a shock when he discovered the owner's Cardiff address on the job—imagine it had flown over 200 miles ! !

September 26th saw the end of **BLACKHEATH M.F.C.**'s contest season, winding up with two glider events. Ron Galbreath won the Club Shield with an aggregate of 5 : 41·3, K. C. Hackman taking the honours in the Novices competition with 2 : 23·3. M. J. Anderson raised the club tow-launched glider record to 12 : 49 at the West London Gala.

Model cars are interesting the members of the **SLOUGH M.A.C.**, a top speed of 34·3 being reached on a 12 ft. line recently—engine a Mills Mk. II. Aircraft are still flying however, witness T. Springs flip of 31 : 07 with his "Fillon Champion". Only the wings were recovered, the rest of the machine floating down Father Thames !

In spite of high winds and rain, the **WIGAN M.A.C.** 2nd Annual Contest brought some pretty good flying, as the following results show :

Glider :	D. Morgan	2 : 05 o.o.s.
	A. B. Fairless	1 : 53
Rubber :	W. L. Mercer	3 : 21
	T. Rhead	3 : 11·5
Power Ratio	D. Morgan	5·2 ratio
	W. L. Mercer	4·44 ,,
	A. Ashurst	4·43 ,,

A.P.S. designs seem to go well with the **THIRSK & D.M.A.C.** Noel Headland's "Fugitive" holds the club glider record with 12 : 00 o.o.s., whilst H. Knowlson's "King Falcon" just revels in gales, and puts up three minute flights in all weathers.

I am asked to correct a typographical error regarding the **DERBY M.A.C.** When announcing the new Derby Model Racing Club, this became confused with the old established club. Secretary is still Mr. Anderson of 111, Bower Road, so please note this as some correspondence has been delayed recently.

An amalgamation of the neighbouring Bolton and Farnworth clubs results in the new title **BOLTON & FARNWORTH M.A.S.** Meetings are held on Thursday evenings 7–10.30 at 130, Halliwell Road. Club records to date are :

Rubber :	F. Clarke	5 : 15
Hand-launched Glider	F. Clarke	4 : 26
Tow launched	C. M. Holden	15 : 20

R. Musgrove of the **OLDHAM & D.M.A.C.** hopes to win the Gosling Distance Trophy with his flight made at the Woodford Rally the model landing over 11 miles away. Incidentally, congratulations to this chap on collecting two British Records, 36 seconds with his tailless rubber driven indoor model, and 40·2 with an outdoor helicopter. L. Gabriels has raised the club H/L glider record to 1 : 30 with a model of his own design.

The **DARLINGTON M.A.C.** propose holding a Winter Rally (out not indoor !) to help maintain interest during the "close" season. (I remember putting on a similar "do" in the old Lancs. M.A.S. on the occasion of Frank Zaic's visit before the war—and boy, was it cold trying to adjust a model ! Still, we had some good flying in spite of umpteen degrees of frost).

V. Sutton of "Sidmouth", Hill House Drive, Billericay, Essex, asks for owners of solid 1/72 scale models to contact him regarding a scheme for putting on shows for the R.A.F. Benevolent Fund.

The East Riding Model Gala organised by the **HULL "PEGASUS" M.F.C.** was held on October 3rd following postponement from the 19th September, when a 35 knot wind made flying impracticable. Cpl. Darby of Leconfield made best flight of the day—6 : 05 o.o.s.—with his sailplane, but an amazing proportion of power fliers failed to keep their engine runs within the 20 second limit. Makes yer fink doesn't it ! Results :

Power :	J. Holbrook	Leconfield	4 : 33·8
	C. Wadsworth	Goole	2 : 46·2
	P. Albericci	Leeds	2 : 23
Rubber :	E. Harris	Pegasus	2 : 29·4
	G. Cameron	Leeds	1 : 58·7
	F. Warren	Goole	1 : 53·7
Glider :	Cpl. Derby	Leconfield	6 : 32·5
	T. Magee	Hull and District	4 : 34·5
	R. Towers	Hull and District	4 : 21

A good entry was received at the **BIRMINGHAM M.A.C.** Rally at Sutton Park held in conjunction with the S.M.A.E. Cup. In spite of an awkward wind which resulted in many lost models, good times were put up as follows :

Rubber :	W. Dallaway	Birmingham	7 : 19·8
	S. Ward	Wolves	5 : 55·8
	R. Monks	Birmingham	5 : 29·1
Glider :	R. J. Perry	Birmingham	6 : 55·9
	F. Chatwin	Birmingham	6 : 06·1
	C. Doughty	Birmingham	5 : 45·5
			total ratio
Power :	J. Marsh	Leicester	24·16
	R. Monks	Birmingham	18·87
	K. Stothers	Leicester	15·97
Control Line :	B. G. Hewitt	South Birmingham	900 points
	I. Yule	South Birmingham	497 ,,
	N. Long	South Birmingham	384 ,,

Miss Bell of the **HUDDERSFIELD AIR LEAGUE**

M.A.C. showed the lads how to do it when winning the club rubber contest on S.M.A.E. Cup day, P. H. Stringer placing second, and further winning the Glider event with a 2 : 14·5 aggregate. He also won the " Woods-Smith " Championship Trophy with a total of 248 points—almost double that of his nearest rival.

At a recent contest held by the **GUILDFORD & D.M.A.C.** one member turned up with a Mills powered C/L flying wing, which proved completely uncontrollable! Though it looped it can hardly be said that the operator knew anything about it!! The speed record stands at 63 m.p.h. (semi-scale Ohlson 23 powered job), but with "hot" engines making their appearance this figure is not expected to be long lived. Best free flight time to date is A. Hodgson's 14 : 00 o.o.s. with his " Banshee ".

Founded in 1946 with 12 members, the **UPTON M.F.C.** is now reaching the 60 mark. Mr. Reynold's glider design " The Dreamer " doing well, this being used by both himself and Mrs. Eves in their successful flying in the S.M.A.E. Cup and Women's events. Best time to date is 32 minutes plus. Club records are :

Open Rubber :	**D. Rudgewell**	**5 : 00**
Wakefield :	**W. Smith**	**1 : 30**
Open Glider	**A. Paynter**	**32 : 20·6**
F.A.I. Glider :	**D. Pope**	**3 : 18**
Open Power :	**V. Howell**	**1 : 43·8**
Tailless Glider :	**D. Pope**	**7 : 31**
R.T.P.	**Mrs. M. Eves**	**1 : 15**
Free Flight :	**R. Walsh**	**: 38·4**
Control Line Speed :	**D. Powell**	**62·5 m.ph.**

A couple of foreign readers write this month asking for pen-pal contacts. Any of you who would like to expand your worldy (modelling!) knowledge might like to contact either D. Madhava Rao, " Maya ", New Katra, Allahabad 2, India, or Rusi B. Mobed, secretary of the Aeromodellers Society, Eduwi Dinshaw Building, 27, Preedy Street, Karachi, Pakistan.

And so, having reached the end of this month's little batch of reports, here goes for a repeat of my sincere good wishes for Xmas, and here's to an even better season in 1949 than this year held for us. Cheerio.

The CLUBMAN.

NEW CLUBS

SHOTTON M.A.C.
J. H. Bolton, 24, Ashbrooke Estate, Shotton Colliery, Co. Durham.
ATLAS M.A.C.
W. P. Walker, 41, Surrey Street, Middlesbrough.
MID-SUSSEX A.M.C.
D. Mitchell, 41, Gordon Road, Haywards Heath, Sussex.
WHITTLESEY M.A.C.
T. C. Harrison, 87, Station Road, Whittlesey, Northants.
LOWESTOFT & D.M.A.C.
K. Jackson, 86, Rotterdam Road, Lowestoft.
GATOW M.A.C.
2374197 AC/1 Woodhall, D., c/o Education Officer, R.A.F. Gatow, B.A.F.O., c/o B.A.O.R.2.

SECRETARIAL CHANGES

HILLINGDON & D.M.F.C.
R. Hill, 83, Victoria Avenue, Hillingdon, Middlesex.
BLAYDON M.A.C.
J. Teasdale, 60, Thomas Terrace, Blaydon on Tyne, Co. Durham.
RAVENSBOURNE M.F.C.
M. G. Cockton, 87, Crown Lane, Bromley Common, Bromley, Kent.
WORTHING & D.M.A.C.
D. J. Winton, " The Ridge ", Findon, Near Worthing.
HALIFAX M.A.C.
J. Magson, 10, Stock Lane, Warley, Near Halifax.
PLYMOUTH M.F.C.
P. J. Ash, 105, Alexandra Road, Ford, Plymouth.
BOLTON & FARNWORTH M.A.S.
F. Clarke, 65, Second Avenue, Heaton, Bolton, Lancashire.
CARSHALTON M.A.C.
P. Cameron, 35, Cambridge Road, Carshalton, Surrey
THIRSK & D.M.A.C.
H. Knowlson, Sessay, Thirsk, Yorks.
HUNTS M.A.C.
G. Gammons, 26, Avenue Road, Huntingdon.
WIGAN M.A.C.
W. L. Mercer, 42, Gathurst Road, Orrell Post, Wigan, Lancs.
LEIGHTON PARK M.A.C.
L. Lazarus, Reckitt House, Leighton Park School, Reading, Berks.
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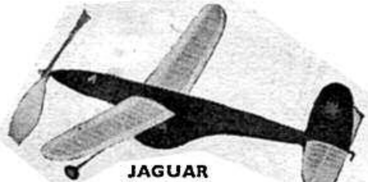

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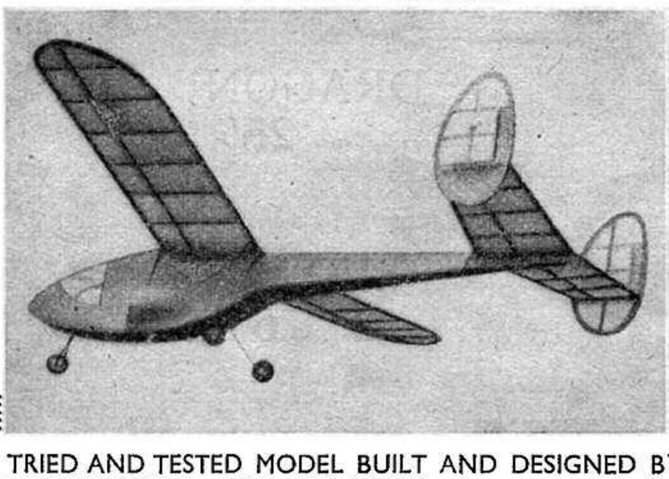

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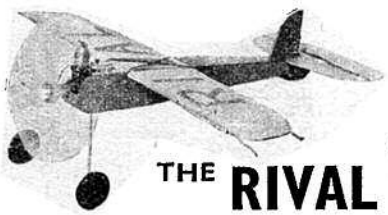

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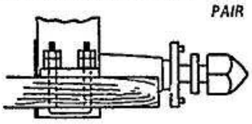

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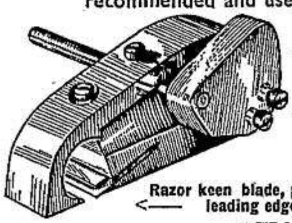

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Age Limits:
Naval Cadetships (Special Entry), 17 years 2 months-17 years 10 months on 1st March, 1949.
First Appointments in the Royal Marines, 17 years 2 months-18 years 2 months on 1st March, 1949.
Entry to Royal Military Academy, Sandhurst, 17½–18 years 8 months on 1st March, 1949.
R.A.F. Cadetships, 17½–19 years 2 months on 1st March, 1949.

N.B. Candidates at the Navy, Army and Air Force Entrance Examination of October, 1948 who are eligible and wish to submit an application for the Feb. 1949 examination, in case they should prove unsuccessful in the October examination, are not exempted from the necessity of applying on the prescribed form by the date specified.

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