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JUNE 1961

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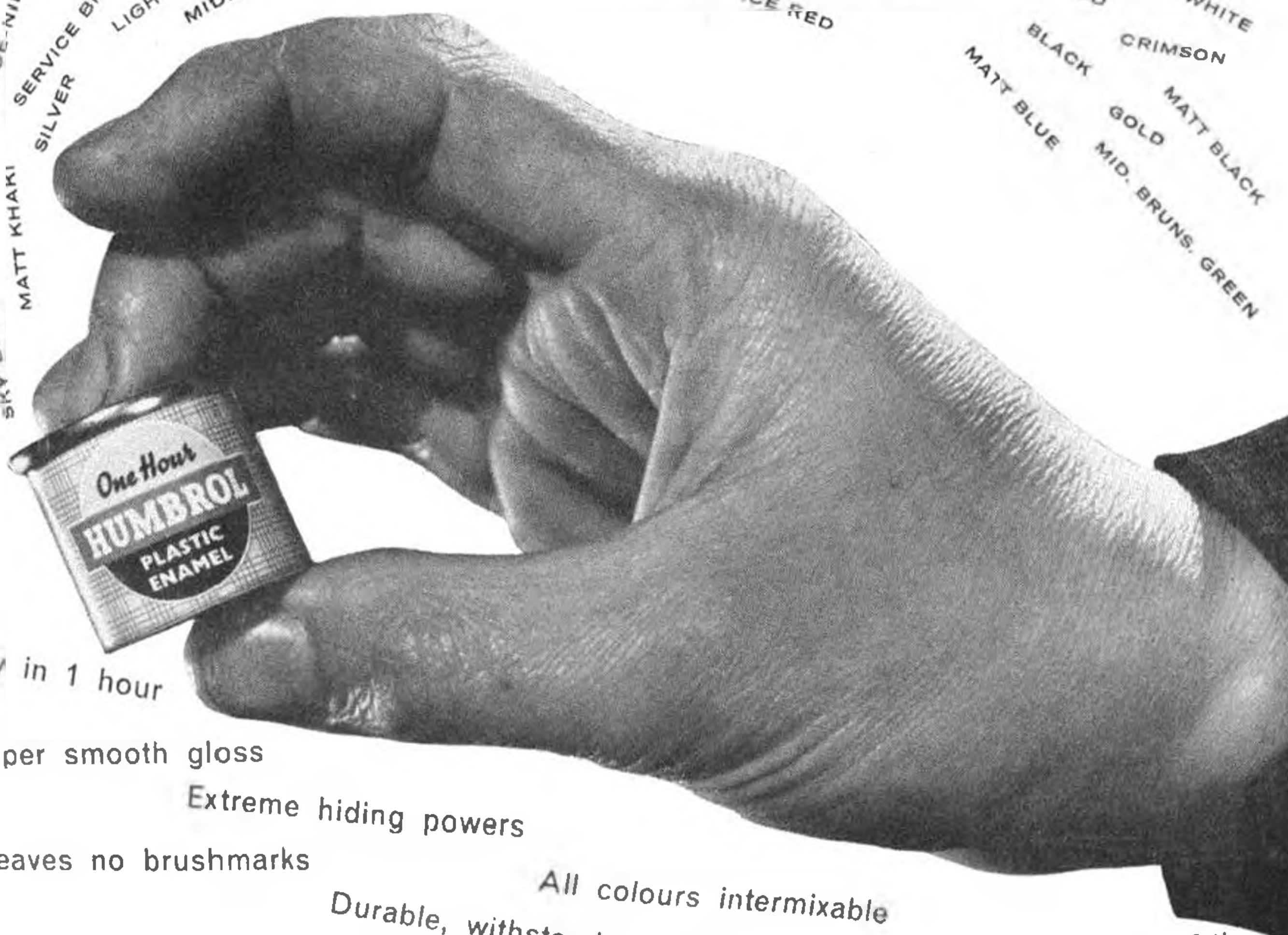

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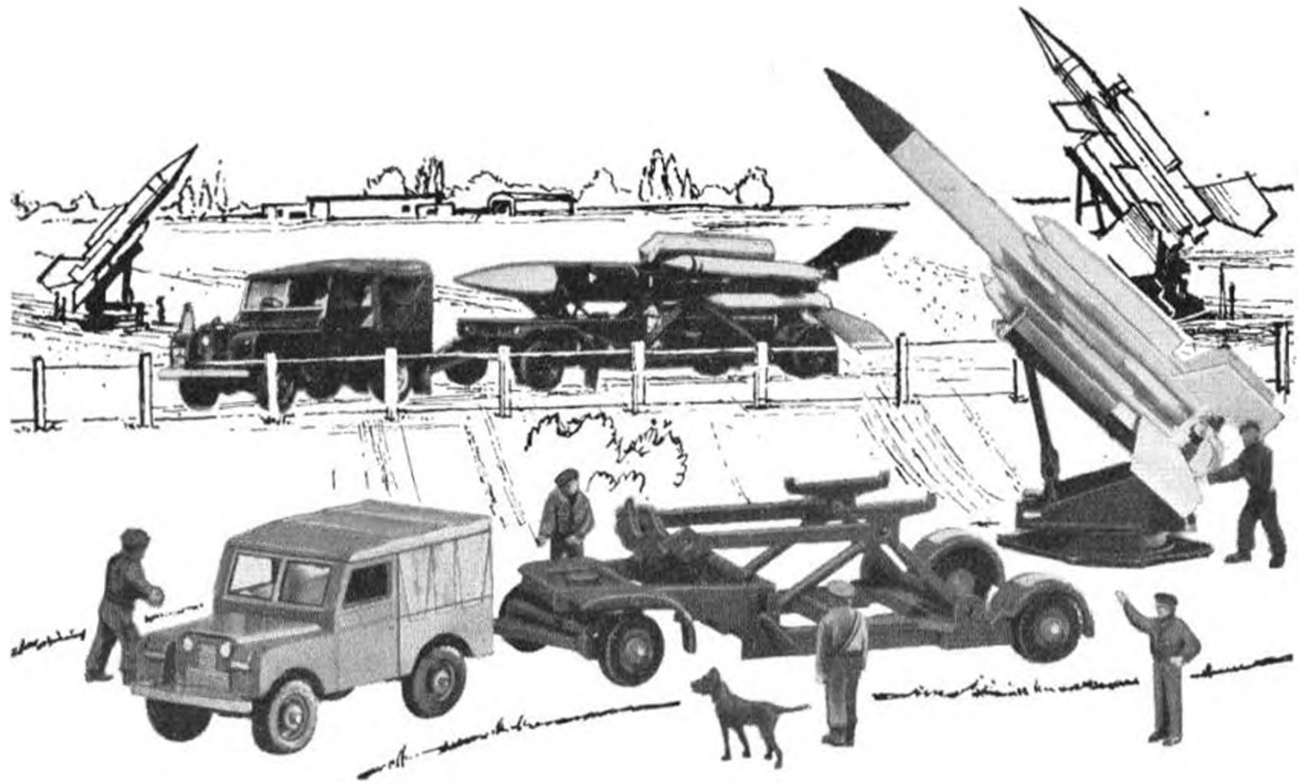

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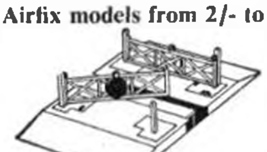

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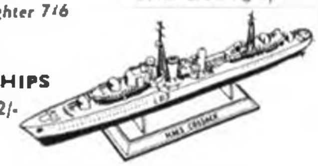

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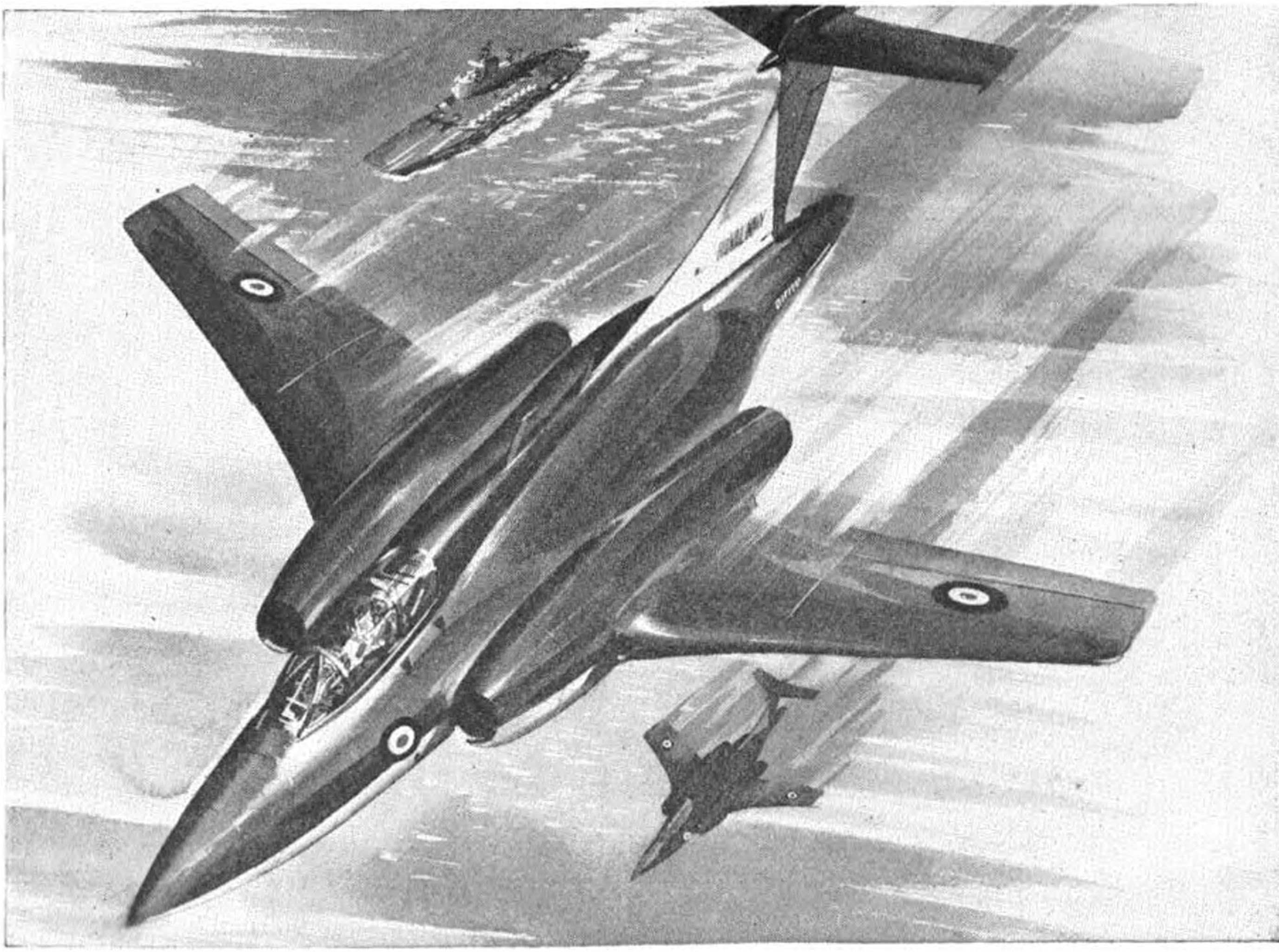

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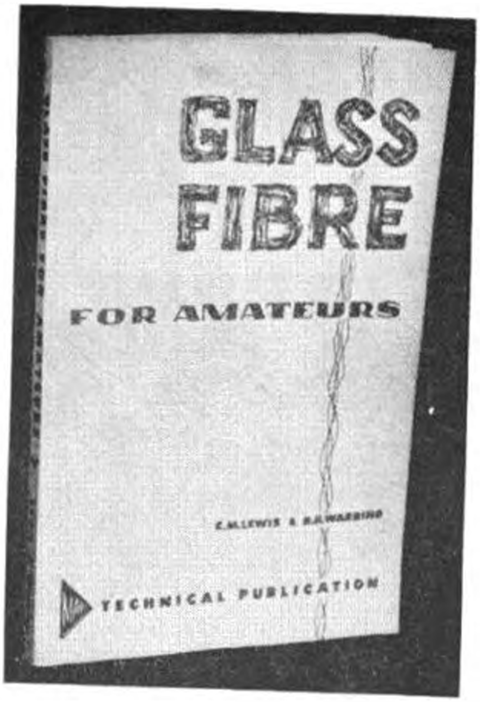

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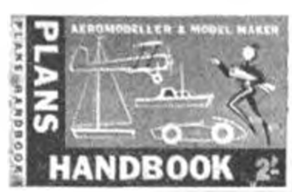

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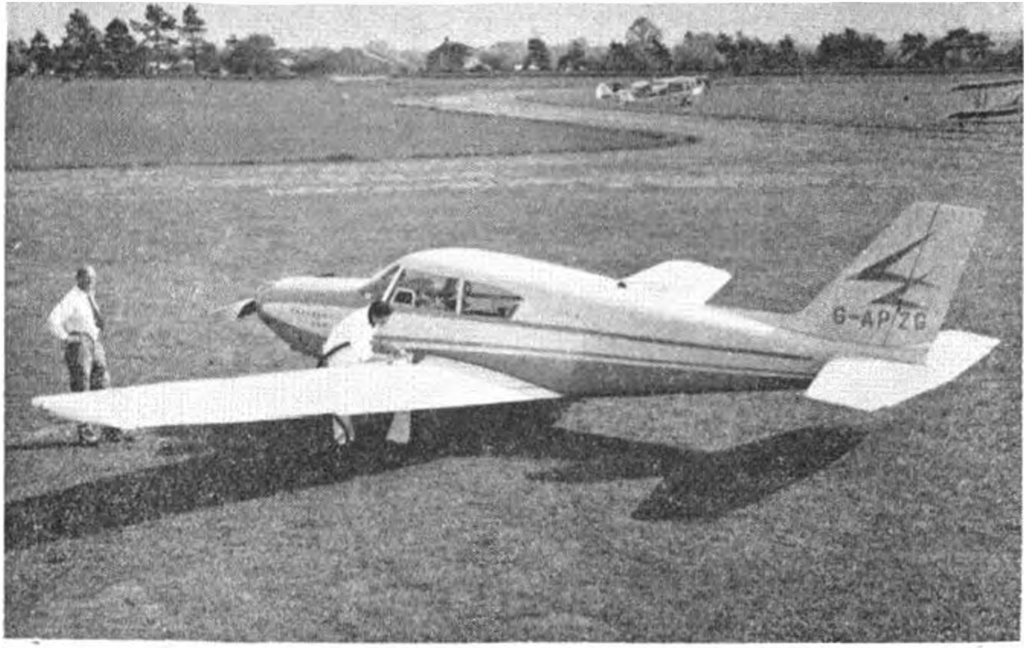

Heard at the Hangar Doors

The 1960 colour scheme in Blue and White for Vigors Aviation demonstrator Comanche at Oxford Airport, Kidlington

AERO MODELLER

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VOLUME XXVI
No. 305 JUNE 1961

CONTENTS

ON THE COVER

Bright in their 1961 colour schemes, the Piper Comanche 250 (in blue) and 180 (in Red) display their elegant and speedy lines. Holder of World distance records (7,668 miles non-stop from North Africa to Los Angeles) and fast becoming common in British skies the Comanche is the subject of our special design feature on pages 294-6.

AEROMODELLER Incorporates the MODEL AEROPLANE CONSTRUCTOR and is published monthly on the 15th of the previous month by the MODEL AERONAUTICAL PRESS LIMITED

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See you at the Nats!

ALL ROADS will lead to Grantham in Lincolnshire for several thousand modellers this Whitsun as the great annual jamboree of assorted contests takes place at R.A.F. Station, Barkston Heath. For several weeks the hotels in surrounding towns have been fully booked and mystified clerks obliged to rebuff hopeful applicants with a "there's some big meeting on at the aerodrome". Club reports are filled with combined ops plans to bring the lads along *en masse* by Dormobile and hired van. The camp site threatens to be even bigger but better run and from all quarters we learn of new "beat-'em-all" models that will walk away with top honours in scale, radio and team race at least.

Yes, everyone concerned is in high fever and rightly so, for the 1961 meeting promises to be even greater than any before. But before we leap into what we hope will be a fair weather festival of model flying, let's stop to ponder on one or two things.

Firstly, remember this meeting is organised by the S.M.A.E. Council and those clubs who volunteer their services. They are going to do their best, but their success depends entirely on competitor and spectator behaviour.

Secondly, remember that but for the kind co-operation of the Royal Air Force, fine airfields such as this one at Barkston Heath would not be available for what is the premier meeting of the year in the British Aeromodelling calendar.

Thirdly, remember that litter is a bad advertisement for the hobby. Be a "tidy mind" — if you took it there, surely you can take the waste back home again. Why not follow the St. Albans club example and equip your group with a mobile litter buggy?

Fourthly, remember to play it *safely*. Accidents in the past years have been the result of foolish flying in crowded areas. If you want a test flight with that 100 m.p.h. combat job — take it well clear of the spectator fringe, we have the whole field to ourselves.

Finally, when next some humbug in the club, or a model shop counter cowboy starts to gripe about the S.M.A.E., tell him a few reminiscences of the '61 Nats (and they'll be legion for many, especially the campers) to put him wise on how the Society provides for its members in the organisation of these grand meetings.

Aid for man power

First allocations of grants to groups entering the £5,000 Kremer contest (for the first to produce a man powered aircraft capable of making a figure of eight, around posts a half mile apart, starting and finishing at minimum of 10 ft. altitude) have been announced. A group at the University of Southampton, and another at de Havilland Aircraft, Hatfield, have the offer of financial assistance up to £1,500. Four other entrants are under consideration for grants, one at Southend, one at Woodford in Essex, one at Imperial College and the fourth at Vickers-Armstrongs, Weybridge. Grants are made through the Man Powered A/C Committee of the Royal Aeronautical Society.

It seems odd that all these experimenters should be grouped in the south, mainly around London, and that we find no prominent modelling names among the lists. Pity this, because we feel that a practically minded aeromodeller, able to divorce himself from the complexities that have been suggested in connection with this contest, could create an oversize (40 ft.) model of about 60 lbs. weight, self stable with rudder only control, and capable of lifting a human prop-pedaler. What about it?

Attention scale fans

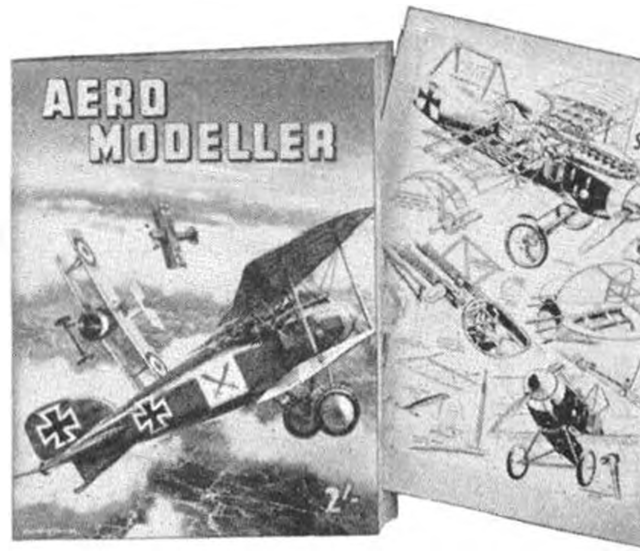
Two important items of news—firstly the re-arrangement of our solid scale plans service. Hitherto, plans have been available to a wide variety of scales and sold individually. This has led to some confusion, especially with those unfamiliar with the British monetary system, and it involves handling difficulties which become increased each month as the range expands. From now on, after the issue of our latest edition of the PLANS HANDBOOK, the scale plans service will be "streamlined" so that all plans are priced at 2s. 6d. *per pack*. This provides the modeller with one copy of all drawings available of the type he orders. It includes reprints with detailed descriptions, plus the enlarged dye-line print, so in fact we are cutting the charges as well as simplifying the system—all to your advantage.

First Cosmonaut

Though the name of Soviet Air Force Major Juri Alekseyev Gagarin has been the subject of tremendous publicity in recent weeks, many of our readers may not be aware that from his youth, this first man to encircle the world in space and return safely to his homeland, was an aeromodeller. Had he not been an enthusiast for our hobby, he would have been an exception, for it is a most significant fact that all the great names in aviation achievement were at one time aeromodellers. If one is to succeed in an aviation career, one should never forsake the hobby. It is a relaxation that always educates and instils the valuable qualities of patience and perseverance. We wonder if Gagarin had time to reflect on his first rubber model as he orbited the globe!

Chance for the keen

The Royal Air Force wants 1,600 young men this September and now is the time to think about entering the Service as an apprentice or boy entrant if you are between 15 and 17. Nomination as candidates can be arranged through local education authorities, youth employment offices or cadet units. Pay is high, the training unmatched in its high standards and, of course, there is that special feature of six weeks holiday with pay each year! There are no "dead end" jobs for the apprentices and opportunities are manifold. The Editor would be pleased to advise any who are doubtful, or Air Ministry, Whitehall, London, will provide literature.



Bumper Issue

Next month's AEROMODELLER will carry a fully illustrated report on the National Championships, with results of every contest and pictures of all the winners in our traditional style. It will also be a "hands-across-the-sea" issue with two absolutely top-line contest designs from the U.S.A., specially chosen from the classes in which our American friends particularly score. Keith Hoover's *Hi-Liner* is an all-sheet ·049 power design with a formidable performance, featuring the increasingly popular high thrustline arrangement, and with details for taking either the lower power engines or larger capacities. Then for the R/C fans, the current hit direct from Los Angeles is Bob Palmer and Dick Larsen's *Gee String* for up to ten channels and offering all one would expect from such a wealth of design experience for aerobatics. Bob tells us that the only manoeuvre that gives *Gee String* any trouble is the vertical eight if a stock 35 is fitted. Radio men will appreciate that this means quite an advance over other more elaborate and weighty models that demand a 45 or 51 to get through the outside loops. Moreover, the model really looks the part. Added to these leading features we'll have an exceptionally detailed "Aircraft Described" for World War I fans, combining the talents of Peter Gray and Ken McDonough on the Albatros D II. Look for the full colour cover as shown above, out June 15th, and you'll also find more pleasant surprises we have in store in July issue.

"What's on" at the NATS

May 21st 22nd BRITISH NATIONAL CHAMPIONSHIPS

R.A.F. BARKSTON HEATH

May 21	Thurston Cup ...	U/R Glider
	S.M.A.E. Cup ...	Radio Control F.A.I. Multi
	Lady Shelley Cup ...	Tailless
	Knokke Trophy ...	Control Line Scale
	Gold Trophy	Control Line Aerobatics
	Davies "A" Trophy ...	Class A (F.A.I.) Team Racing
	Combat	Preliminary Heats
	Speed	
May 22	Sir John Shelley Cup	U/R Power
	Model Aircraft Trophy	U/R Rubber
	Short Cup	PAA-Load 2·5 c.c.
	Super Scale Trophy ...	Free Flight Scale
	S.M.A.E. Cup ...	Radio Control F.A.I. Multi
	Team Racing ...	Class ½A
	Davies "B" Trophy ...	Class B Team Racing
	Combat	Final Rounds
	Speed	Final Rounds

READER'S LETTERS

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

That Gasser

DEAR SIR,

I refer to part of my address at the Annual Sutton Coldfield R/C M.A.C. Dinner, when I pointed out that The Model Aeronautical Press Limited had served as a link between all sections and members of our hobby. This was forcibly confirmed when reading the May edition of the AEROMODELLER, when a reader from Lincoln, mentions that he saw about five months ago a GASSER fitted with an ENYA 19 glo plug engine, as per the photograph of my own model published in the Model News Section of your Magazine Christmas, 1959. There is little doubt that the model Mr. D. Furbank saw at Lincoln was in fact my model, as this mysteriously vanished in Sutton Coldfield Park after a fly away, although at the time the model was visible until touch down, but when we arrived to retrieve it, had vanished without trace and although the full membership of the Club spent many hours combing the area, has not been seen again to this day.

The Sutton Coldfield Police were advised at the time and will have full details in their reports and purely from a matter of interest I would like to take the matter further if Mr. Furbank could supply any more details regarding the new "owner". The most unusual part of this story is that the photograph you originally published showed a model fitted with a HORNET 1.49 c.c. diesel engine, but it was, due to being considerably over weight, fitted with an ENYA 19 Glo Plug Engine immediately prior to being lost.

Please accept my grateful thanks for all the kind co-operation that both the Club and I have received from your goodselves and The Model Aeronautical Press.

SUTTON COLDFIELD R/C M.A.C. — G. A. V. MARSH. *(President)*

Contest Gliders

DEAR SIR,

I would like to compliment you and Mr. Baguley on the excellent review of Contest Gliders which should provide much food for thought and inspiration to designers. I do hope that this series will be followed by a similar treatment of f/f Power and Wakefield Rubber models.

I have however, a comment to make on the author's statement with respect to Mr. Amor's model *Lucifer*. He states and I quote: *"but a flat undersurface is used, necessitating a more forward C.G."*

I accept of course, the fact that flying tests proved the need for a forward position of the C.G. However, I fear that the statement as it stands might be mistaken as a design law and thus lead to misunderstanding. The implication would seem to be that a reduction in centre-line camber of the tailplane section necessitates a shift forward of the C.G.

This is most certainly not the case. A reduction of camber in the tailplane section does not imply a change in position of the C.G., the C.G. being related to the position of the aerodynamic centre of the model, which is independent of the camber of either wing or tailplane sections. (It is assumed that the geometry of the model remains unchanged). Reducing the camber of the tailplane section does, however, require a modification of the model's geometry, in the sense that the moment arm of the tailplane must be reduced. Similarly, an increase in the camber of the tailplane section will have to be followed up by an increase in the moment arm.

I intentionally use the word must, because we should aim at optimum longitudinal stability; excessive stability should be avoided since it is both wasteful aerodynamically and will make it impossible to achieve that fine degree of trim necessary for rapid reaction to changes in angle of attack due to gusts etc.

For each given set of design elements: area, span, chord, aspect ratio, centre-line camber, for both wing and tailplane, the optimum moment arm can be accurately calculated. From this follows the position of the C.G. to within a very small margin, the final position to be found by experiment.

This method, based on the calculation of the aerodynamic centre of the complete model, has been developed for the use of aeromodellers by Beuermann of Germany. Application to a large variety of models, as well as verification by applying it to new designs, has shown that this method fits actual practice in a most convincing manner. It might be a good thing if more publicity could be given to Beuermann's work since it would do away with formulae and ratio's which fail to take into account the essential factors. After a little practice the calculations for a new design are carried through in less than half an hour with a saving of many hours trimming. Another advantage of this method is that it immediately shows the required changes in the layout to obtain the best possible longitudinal stability.

Returning to the *Lucifer*, my calculations show that this model possesses a very high, frankly excessive, degree of longitudinal stability and this was the reason why the C.G. had to be shifted forward. I found that the distance between wing and tailplane might safely be reduced by as much as 7½ inches or the area of the tailplane by about 20 per cent., however, this would make it rather inefficient and the model fairly tricky to trim.

It will seem to many rather bold to aim such criticism at a model of outstanding quality and I would like to add that my admiration of Mr. Amor's design is considerable and the same applies to his trimming and starting technique. But the very reliable tool forged by Beuermann indicates a possible improvement. It would be an interesting excercise to modify a *Lucifer*, changing only the distance between wing and tailplane to 23 inches and look for an improvement in performance. For one thing, the moment of inertia of the tailplane would be reduced by more than 40 per cent., another factor which would lead to an improvement in longitudinal stability.

It would be very useful if the main geometric data could be included in future articles by Mr. Baguley, so that we could apply this method to outstanding designs.

J. VAN HATTUM.

ROYAL NETHERLANDS AERO CLUB,
THE HAGUE.

Twanging towlines

DEAR SIR,

It is evident that in requiring towlines to be subject to a 5Kgm. pull test, the F.A.I. have made rather a hasty rule change.

At the first A/2 eliminator, of the lines tested in this area something like 50 per cent. failed to stand the pull, so that measuring their extended length was somewhat difficult. One can only assume that a towline not exceeding 50 mtrs. at failure is acceptable to the rules as in our often windy flying conditions, many people use the lighter lines to provide a reserve of safety during gusts, rather than to obtain any height advantage from their greater elasticity. That these lines are quite adequately strong enough for normal use, and indeed to break a wing or two, is a fair indication that 5 Kgm is an excessive load to impose on a line which may well have local weak spots due to flaws in the material and/or wear and tear.

It is unfortunate that the C.I.A.M. cannot find some way of carrying out practical tests on their proposed rule changes in non championship years, before they are implemented, as it would seem that the original purpose of this rule change; is to limit line extension, not enforce the use of heavier lines, has been lost.

G. W. DALLIMER.

STEVENAGE, HERTS.
(Comp. Sec. South Midland Area)

A thank you

DEAR SIR,

I received my issue of AEROMODELLER, approximately 5 weeks after the date of issue, and in this country the AEROMODELLER is the only way of keeping in contact with the hobby at all.

After not receiving the January issue, (presumed lost in post) I wrote to you asking if it was possible for you to send a further copy. Within 10 days of posting my letter I received an airmailed copy back, this is service indeed.

I only hope those fortunate people who are constantly grumbling appreciate the excellent service that they receive.

A. T. RANGER, A.M.I.E.T.

TORORO, UGANDA.

(Hoping you publish this letter for the benefit of the less appreciative modeller).

Single channel R/C

DEAR SIR,

I feel that the recent summary dismissal of the single-channel radio-control event from the Nationals, by the S.M.A.E., warrants some critical discussion.

Concern has already been expressed elsewhere in your publications, as regards the nature of the decision and the manner of the announcement, and these will be discussed later, but aside from particularities, there are wider consequences which could endanger the development of single-channel radio flying in this country. This in itself would eventually debilitate multi-control flying and aeromodelling in general, by removing the obvious and usually the only possible means of acquiring intitial experience in radio-control flying.

The announcement of the National's decision was made in an abrupt fashion with no opportunity for discussion beforehand. This creates a dangerous precedent which could easily have been avoided by the circulation of a questionaire to affiliated clubs, asking for suggestions of the type incorporated later in this issue.

In the absence of any explicit reasons for the decision, we are forced to consider, in vacuo, those most likely to have influenced the S.M.A.E. It seems probable that the following are the most important:

(I) The relatively low standard of many of the single-channel entries in previous years leads to lack of spectator appeal and requires excessive airspace and organisation for the results achieved. It may be felt that, even if expertly flown, these models are incapable of a wide enough range of manoeuvres, anyway.

(II) This type of event is not playing an important part either in the development of new equipment or aircraft design trends or in flying skills.

(III) Pressure exerted by the "semi-professional" class of radio-control flier who disregards the less wealthy modeller or the experimentalist.

These are not just reasons for a particular decision taken with respect to the Nationals, but are really consequences of attitudes taken towards single-channel flying in general. They will now be examined from both points of view.

Considering (I) first—it is not denied that the standard of flying has been generally poor, but the Nationals are not meant to provide spectator sport for the general public. From this latter point of view all of the Free-flight classes would also be omitted! Rather it is to provide a comprehensive opportunity for the development of aeromodelling by interchange of ideas and improvement by competition. In any case, the same criticism was applicable to multi-radio-control until reliable reed equipment and new aircraft designs were introduced only three years ago! So, instead of removing one of the few opportunities for new fliers to gain experience, we should examine the rules in order to see what could be done to inspire a higher standard of flying and reliability.

The suggestions that follow will serve to answer both attitudes (I) and (II):—

Faults in the present rules consist principally of specifying "rudder only" or "rudder and engine" for competition purposes, and restriction to "precision" or aerobatic flying. Classification should impose restrictions to a single channel of communication and leave open opportunities for mechanical, electrical, and aerodynamical ingenuity to employ any number of controls. Secondly, why must we be restricted to aerobatics? An analogy may be drawn here with the progress of control-line flying, where the initial incentive to develop equipment and flying techniques was obtained by demanding aerobatics. After the earlier years, however, many new branches have appeared and new enthusiasms formed, thus keeping this section of aeromodelling alive and vigorous.

In the case of radio-control, the period of initial development via aerobatics, has provided specialised equipment and airframes which can scarcely be improved upon without new requirements.

I would suggest that we might introduce:—

(a) A single-channel class of pylon-racing, —here newer control systems such as the pulse proportional types, would have useful application. It has already been suggested to the Cambridge M.A.C. that rules for a restricted class might consist of:—

1. One channel of radio-communication only.
2. Maximum engine capacity 2.5 c.cs. *but no* minimum airframe size in order to allow of more entries being accepted and more experimenting carried out.
3. A triangular or circular figure-of-eight course set crosswind to provide about 1-2 miles total distance with say 2-4 laps.
4. R.O.G. required, timing to commence from either a standing or flying start, and concluding with the passage of the model past the final pylon.

This would encourage the production of reliable fast models trimmed to fly "straight and level", rather than the slow clumsy flight that one so often sees.

(b) As an incentive to the development of superhet or tuned-filter equipment, the sponsoring of a class for combat or pylon-racing with two models being flown simultaneously would show some inspiration on the part of the S.M.A.E. and the response would not fail them if announced well ahead of a competition date. Certainly this should be possible in 1-2 year's time and some of us would like encouragement now.

(c) Scale—this has already been suggested and acted upon by the Sutton Coldfield Club.

Finally (III) may be examined. As has recently been pointed out, the radio-control sub-committee of the S.M.A.E. has no member representing the interests of single-channel enthusiasts and consequently any pressure, psychological or otherwise, that has fallen on this group of officials, can only have been directed against single-channel interests. The removal of the single-channel event from the World-Championships has also created a bad precedent which they have been led to follow, in spite of the fact that this competition gave rise to several good models which have since been kitted (e.g. Vagabond, Stability, Viking, etc.).

We should feel very concerned lest any possible prejudice against single-channel flying or the effects of growing commercialisation of this hobby should discourage this branch of modelling. The removal of competition on a national level will inevitably cause a reduction in the rate at which reliable radio is produced and at which better kits are marketed. The state of affairs at the moment as far as good kit models, or even good radio-control equipment (apart from multi-reed units) is concerned in this country, leaves no cause for complacency, especially when contrasted with German or American progress in this field.

I apologise for taking so much space up for this discussion, but I feel very strongly that the action over the Nationals is unimaginative and may, if not opposed, lead to an overall degeneration of a very important part of our aeromodelling movement. In any case, no decision of this nature should have been made known in such a casual fashion.

B. G. J. THOMPSON.
Peterhouse, CAMBRDIGE.

Noisy engines

DEAR SIR,

In flying stunt models for some years now, I have noticed the trend among others as well as myself toward the larger engines. At present, of course, we all fly ·35's, but it may be that even larger engines have something better to offer toward performance in still larger models, and I personally see no halt in this upward trend for quite a while.

Now, this problem of NOISE is, let's face it, getting very real. I will confess to getting a thrill from a ·35 glo motor's howl, but recently have come to realise that this is not similarly appreciated by the layman.

This started me on a quest for a silencer for my Mercos. With what success?

None.

We all know that soldering is of no use for forming a silencer due to the heat. (A club-mate of mine tried it. The said silencer fell to pieces immediately upon contact with the engine!) Further, not every owner of a sizeable engine has access to brazing or welding equipment. In this connection, your contest of the July 1960 issue was of no help since the designs were beyond the building *by the average modeller*.

Your magazine is well alive to the problem, but it honestly is high time that the trade also realised that noise can kill their sales eventually.

So, to summarise, let's say this — I for one am willing to bolt the contraption on if the trade are willing to make one.

What about it?

DAVE PLATT.
STAMFORD HILL,
LONDON, N.16.

NATS NOTES

Class A Team Race to be run by Hayes and D.M.A.C. Contest will be 100 per cent. F.A.I. (1961 rules and models) so remember:
0·3 mm. (·0118 ins.) minimum line diameter
2·5 cms. (app. 1 in.) Minimum wheel diameter
3·9 sq. cms. (6·045 sq. in.) minimum fuselage cross-section area.

Two circles will be in operation continually from 10 a.m. onwards. Heats will be run every 12 minutes and will have four models each. Each entrant will fly two heats, the fastest of these deciding who goes into the 3-model final. A clock maintained at G.M.T. will be in front of the control tent: heat times will be based on this and will be rigidly adhered to. Entrants will be supplied with their heat times (rounds 1 and 2) as soon as possible. At the contest, they must report to the control tent five minutes before their heat. If entrants do not number more than 110, the final will take place at 4 p.m. It will be impossible to completely check 100 plus models but all models will be liable to spot checks.

No whipping, high flying or other misconduct will be tolerated, but the emphasis will be on prior warnings rather than disqualifications. The timekeeper-lapcounter will be alongside the segment the entrant starts from. The entrant will be able to check his laps with him if so desired.

A complete set of the 1961 F.A.I. rules will be posted outside the control tent.

K. LINDSEY,
Hayes M.A.C.

. . . and camping

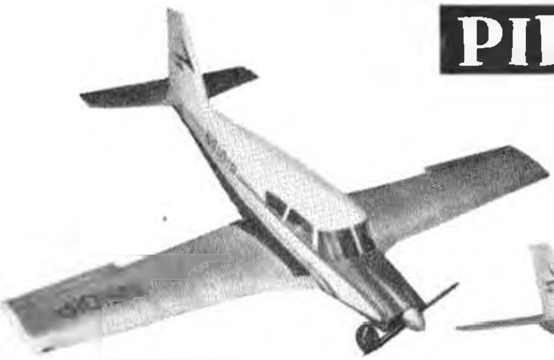
It is probable that there will be some limitation on the number of camping permits sold for the camping site at this year's Nationals. This is to avoid the gross overcrowding that occurred last year. It will, therefore, be advisable to return the application forms early. There will be a strict control to ensure that entry to the site is by permit only, so do not turn up without and expect to get in! Also, steps will be taken to discourage unauthorised camping on road margins etc. — you have been warned. Permits will be issued per head, not per tent, at 5s. each. There will be adequate receptacles for rubbish, but campers should make every effort to take away anything they bring with them: this is very important to ensure camping sites in the future. We will have the co-operation of the R.A.F. Police and anybody creating a disturbance will find themselves ejected from the site.

After which fearsome list of threats it only remains to say that we expect to provide adequate toilet accommodation this year.

C. J. PERCIVAL,
Spring Park M.A.C.
BECKENHAM.

PIPER Comanche

A superb $1\frac{1}{4}$" equals 1' scale controline model with retracting u/c, for 2·5—3·5c.c.



designed by Laurie Ackroyd

WINNER OF THE 13th NEW ZEALAND CHAMPIONSHIPS

SELECTION OF THE Piper Comanche as a detailed C/L scale project was inspired by the publication of photographs of the prototype about the same time as a report in AEROMODELLER on the J. Roberts *Flight Control* system. At that time Laurie's Fokker F.VIIb.3m. *Southern Cross*, A.P.S. plan CL688 model, (7s. 6d. plus 6d. post), exhausted its share of success's at National and provincial meetings and had become, like the original, fuel-soaked and vibration-racked. Construction of a replacement model was due and while a tricycle undercarriage type offered something of a challenge, the way was made clear with *Flight Control* and some assistance in this direction was given by designer Bob Smurthwaite himself, who fitted a Veco .19 motor with *Varispeed* slide throttle.

Throttle, flap and u/c control

The obvious construction with a model fitted with working gear for the motor speed, undercarriage and flaps with all their attendant rods, levers, cams and linkages was to have this equipment mounted on a rigid keel of plywood so that operation would not be affected by the stresses to which the model may be subjected. Accordingly, it was designed to utilise the cabin floor as a horizontal keel of 3/16 in. ply, on to which ply formers lock and the mechanism is mounted on the underside of this keel.

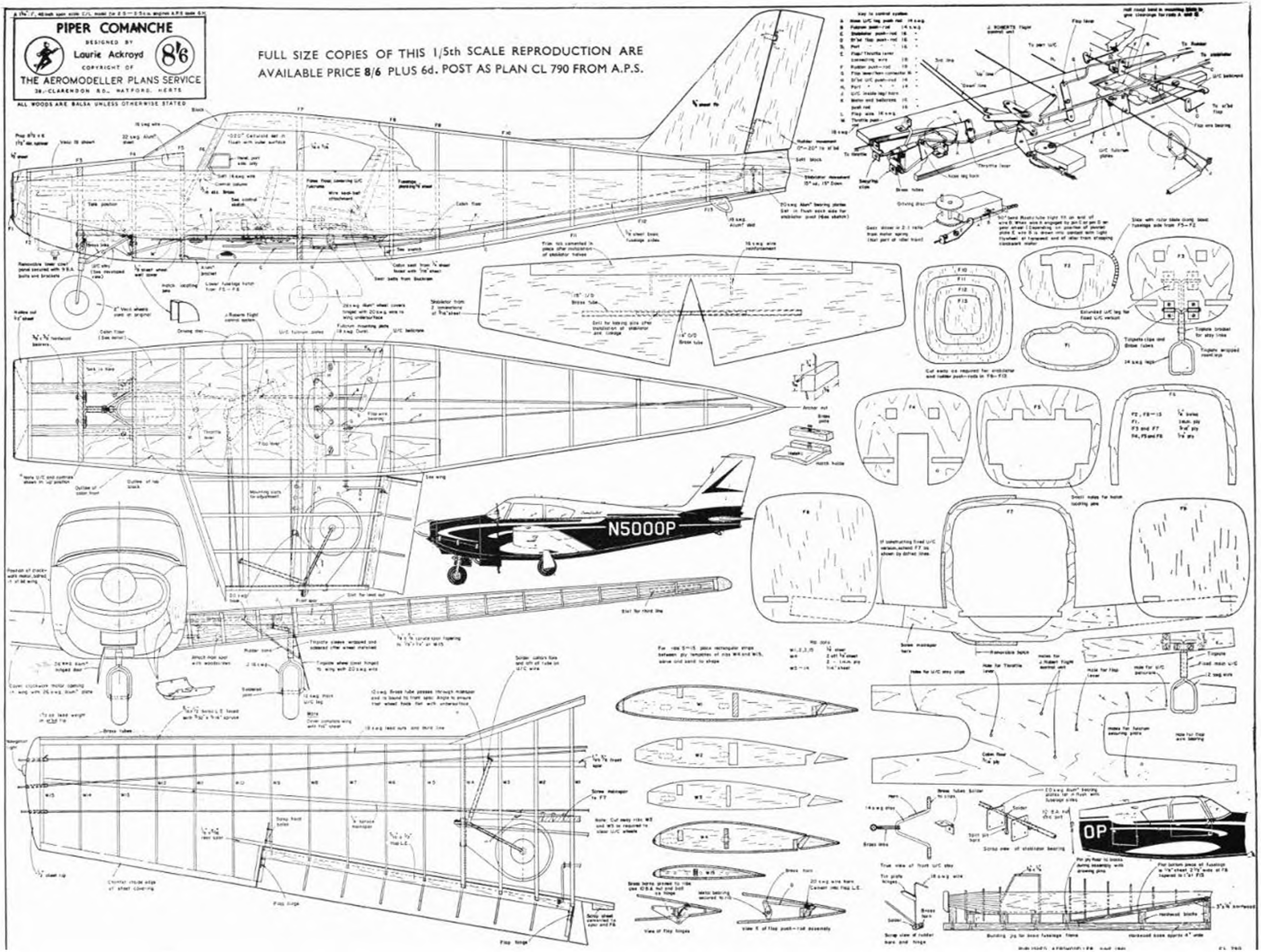
This model, spanning 45 in., represents all Laurie Ackroyd's model building activity over the past two years, interrupted only by a couple of C/L stunters and an F.A.I. power model. The greatest portion of time went into the design, experiment and installation of the clockwork-operated retracting and extending undercarriage, flaps, rudder and motor speed controls. Although the photo shows a mass of rods and levers which appear overcomplicated and hard to follow, the result is a self-locking undercarriage which works beautifully. The interconnected motor-speed, flaps and rudder (offset at slow speed) are relatively simple; but it all adds to the seeming jumble of linkages which are housed in a depth of less than once inch beneath the plywood floor of the cabin. Thus the interior is not encumbered by gear which would detract from scale effect. For the modeller who prefers to "simplify", detail is provided for fixed gear.

Plywood and balsa are combined in the basic airframe which was built on a simple jig to ensure alignment and accuracy to scale was maintained through the use of ½ in. to 1 in. factory blueprints, brochures, cutaway drawings and photos provided by the Piper Corporation for the 45 in. model. Having tried aluminium foil on a previous model with disappointing results Laurie used paper-backed aluminium successfully on the Comanche. It is applied in strips up to 4 in. width using a thinned-down solution of white Bostick contact glue on both surfaces.

The first step in construction is to make the fuselage assembly jig, which is quite a simple affair of pine or similar semi-hard wood. The keel and ply formers are fretsawn, using bonded plywood of good quality and even texture. Formers are checked for correct alignment on the keel before assembling them with motor mounts in place on the jig. A slow-drying cement such as P.V.A. is required for all the joints except balsa-to-balsa, and even here it is found advantageous to use P.V.A. for sheet covering particularly. The balsa formers are cemented in place on the $\frac{1}{8}$ in. sheet fuselage undersurface which is pinned to the sloping portion of the jig, then the fuselage basic sides are added, the nose portion being slit to allow it to follow the contour of formers F1 and F2. This results in a series of ridges inside and out from F3 forwards, the outer surface being filled with $\frac{1}{8}$ x $\frac{1}{8}$ balsa, which is later sanded down. The frame is now sufficiently rigid to remove it from the jig for installation of the bellcrank unit, nosewheel gear and actuating linkage for the other two wheels.

The wings are then constructed over the plan, shimming up leading and trailing edges while the spars are set in place. Mainspars are glued and screwed to F5 and both leading and trailing edges are tailored to fit against their relative formers, being glued in place. Apply the upper wing skin of 1/16 in. sheet with the fuselage frame again pinned to the jig and the wingtips blocked to resist twisting during this operation. Locate and drill for main wheel gear bearing tubes in the spars, ensuring that the angle of the tubes allows the wheels to retract flat into the wings, just clearing the mainspar. The undercart wire may be bent "cold" or done after annealing and subsequently re-tempered for rigidity. The linkage from the triangular plates (fulcrums) in the fuselage is then completed and retraction is co-ordinated by adjustment of the mounting plate located on the keel using slotted holes. The front leg actuating rod must be located carefully on the actuating lever so as to ensure that all three wheels are fully extended and retracted together. The clockwork motor is a cut-down

(Continued on page 296)


PIPER COMANCHE
DESIGNED BY
Laurie Ackroyd
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE
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ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
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AVAILABLE PRICE 8/6 PLUS 6d. POST AS PLAN CL 790 FROM A.P.S.
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OP

Piper Comanche *(Continued from page 294)*

"travelling alarm clock" gear train. It is mounted in the starboard wing root and connected to the actuating lever. A stop is rigged to trip the mechanism at the flywheel each 180 degrees of the operating crank movement, depending on the position of that part of the Flight Control bellcrank to which the centre line is attached. Be prepared to use several scraps of wire and sheet metal until the exact lengths and positions are obtained for the mechanism to work smoothly and reliably without undue strain on the little clockwork motor. The motor key is, of course, removable so that there is only a winding spindle seen in the key hole in the cover plate on the wing underside of the finished model.

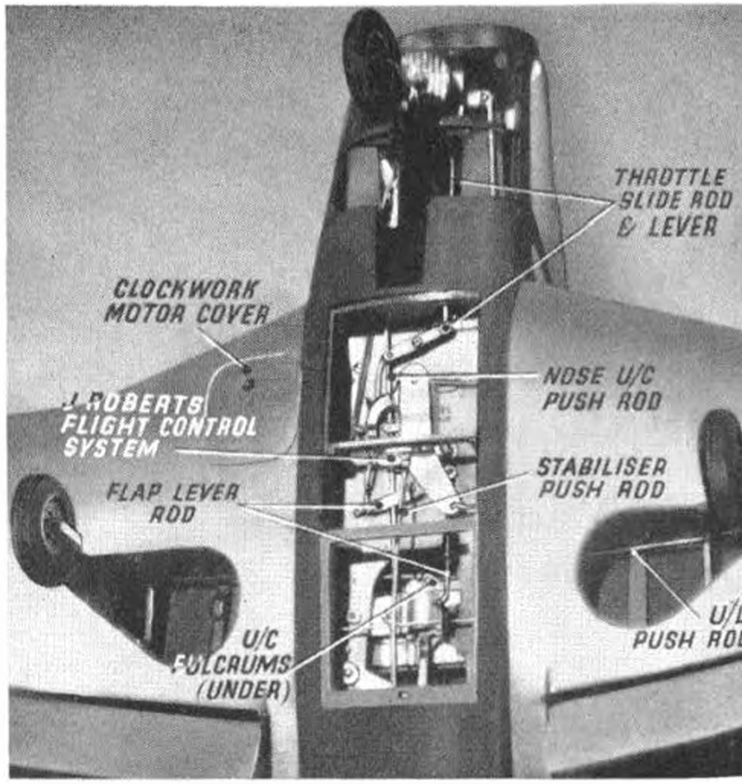
Construction of the tail surfaces and completion of wing and fuselage sheeting is quite straightforward. Flaps are made and fitted, flap linkage and motor speed linkage installed and the cabin interior is fitted up with dummy controls, seats, belts, etc. Note that the stabilator movement is "geared down" from the bellcrank and that the brass tube stabilator attachment pivots in metal plates set in flush with the fuselage sides. Stabilator halves are drilled to take tubes which are a snug fit over the brass tube and are locked in place by screws tapped through both tubes from underneath.

Third line control is so arranged that only the last one third of the movement trips the clockwork motor stop. From the idling position with wheels and flaps down the sequence is simultaneous raising of flaps and motor speed, followed by wheel retraction at will. A stop gate on the Flight Control handle saves premature retraction and the model should not be flown until the exact length of the third line has been determined by ground tests with motor running and tension on the lines. Assuming the undercart is in the retracted position the first quarter of trigger movement trips the clockwork motor stop, allowing the undercart to extend, with power still at full revs and a very slight amount of flap deflection. Continuing trigger movement applies further flap and slows the motor. An internal line from the flap control to a rudder horn is used to apply offset (right) rudder at slow speed so that adequate line tension is maintained at all times. The clockwork motor is held in place by bolts tapped into small alloy plates to allow removal of the unit for adjustment and cleaning. It should not be left in the model during sanding operations.

The finish applied to the model will count for several points in a scale contest. Use at least three coats of sanding sealer, rubbing down between each and brush on four coats of decorating enamel, followed by a fuel-proofer of good transparency. Metallised paper was used on the wings and horizontal tail of my model, applied in up to 4 in. width with white Bostick contact glue. Any excess can be removed with petrol. Most production Pipers are painted all over so this may be preferred to metallised paper. The colour scheme is the standard Piper decor, which varies from year to year, those on the cover are 1961 Comanche 180 and 250 schemes.

Before flying check that the C.G. is in the correct place. The original required 1½ ozs. of lead inside the cowl and the all-up weight came out at just over 3 lbs. A good .19 will give ample power and anything larger cannot be accommodated within the cowl and airscoop. The aluminium undercowl can then be attached in proper scale fashion using wire clips secured with bolts.

A final word about flying the Comanche—hold her on the deck awhile, to let speed build up before lifting off—you'll be really pleased with her true to scale zoom climb as the undercarriage bangs up just like the real thing.



Underbelly panels remove to inspect the Comanche controls. The J. Roberts "Flight Control" system is used to full advantage in this magnificent model. Simple bellcrank and fixed flaps and undercarriage can, of course, be employed instead. Details are given on the A.P.S. plan

S.M.A.E. Contest results

PILCHER CUP

Unrestricted Glider 163 Entries *Decentralised*
5th March, 1961

1.	Jackson, R.	Littleover	9:00	4:20
2.	Crisp, A.	Abingdon	9:00	3:55
3.	Laxton, D.	C.M.	9:00	2:50
4.	Aitkenhead,	Clevum	9:00	2:20
5.	Young, F.	Birmingham	9:00	2:15
6.	Richards, C.	Hayes	9:00	1:15
7.	Simpkin, A.	Market Harboro'	9:00	0:56
8.	Tootell, W.	R.A.F.	9:00	
9.	Illsley, D.	Birmingham	8:57	
10.	Lavender, B.	Brentwood	8:55	
11.	Flaherty, R.	Cardiff	8:42	
12.	Birks, J.	Chorlton	8:41	

GAMAGE CUP

Unrestricted Rubber 78 Entries *Decentralised*
5th March, 1961

1.	Wharrie, A.	Norwich	12:00	9:03
2.	Tideswell, G.	Baildon	12:00	6:15
3.	Lennox, R.	Birmingham	12:00	5:59
4.	Poole, D.	Birmingham	12:00	5:13
5.	Thorbon, B.	St. Albans	12:00	5:02
6.	North, J.	Croydon	12:00	3:38
7.	Thorpe, E.	Derby	12:00	2:51
8.	Leppard, R.	Croydon	12:00	2:39
9.	Greaves, D.	Leamington	12:00	2:39
10.	Barnes, J.	Liverpool	11:47	
11.	Amor, R.	Essex	11:46	
12.	O'Donnell, J.	Whitefield	11:31	
13.	Crossley, P.	Blackheath	11:30	
14.	Anderton, A.	Norwich R.A.F.	11:26	
15.	Nelson, W.	Sheffield	11:26	

WHITE CUP

Unrestricted Power 120 Entries *Decentralised*
5th March, 1961

1.	Petty, C.	Walsall	12:00	12:50
2.	Monks, R.	Birmingham	12:00	6:48
3.	Simeons	St. Albans	12:00	6:46
4.	Thorpe, E.	Derby	12:00	5:17
5.	Miller, D.	Cambridge	12:00	5:02
6.	West, J.	Brighton	12:00	4:25
7.	Draper, R.	Coventry	12:00	4:05
8.	Ambrose, N.	Ipswich	12:00	3:57
9.	Penberton, P.	Abingdon	12:00	3:35
10.	Spurr, A.	Teesside	12:00	3:35
11.	Posner, D.	Surbiton	12:00	3:16
12.	Savini, S.	Liverpool	12:00	
13.	Crisp, A.	Abingdon	11:57	
14.	Fuller, G.	St. Albans	11:41	
15.	Male, J.	Portsmouth	11:40	
16.	Lowe, G.	Liverpool	11:36	
17.	King, C.	Cambridge	11:35	
18.	Glazin, J.	Ipswich	11:34	
19.	Petrie, D.	E. Montrose	11:32	
20.	French, G.	Essex	11:32	

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Contest GLIDERS

PART 3 OF A NEW SERIES BY JIM BAGULEY

Having laboriously criticised most well-known designs of the last 10 years in parts one and two, while referring to flying technique in order to complete the history of this period, it is felt that it would be as well for the author to criticise his own progress in a similar manner!

The following 16 designs to be analysed do not represent anything like the total number actually built and flown.

Development represented by this selection has taken place since 1954 and is therefore, quite intensive. The writer maintains that if there is a mistake to make with gliders (any one cares to mention), he has made it! Not all mistakes are represented here. Less than half of the designs shown could be considered good contest models—which is quite an admission!

One design included is not the author's but that of a friend, who has since given up modelling, but whose glider development ran parallel with the writer's for years and was usually leading. It is shown in diagram 37.

The latest, highly successful, large glider is shown in diagram 42. The latest A/2 is in diagram 45.

DESIGN 1, 1954, *Diagram* 30:

With a vast moment arm, airfoils far from matched, orthodox C.G. position and longitudinal dihedral and considerable longitudinal inertia, this design was hopeless in more than a breath of wind. Construction was sensible, even if the wing construction was tedious by using five spars going through the wing ribs. It was inspired by a photograph in AEROMODELLER of one of the intended 1953 British Team Models and of course, incorporated the latest idea of a drooped trailing edge wing airfoil!

It staggered around quite happily in calm weather for a regular 2½ min. : plus, and so bucked the writer that it triggered off quite a succession of freaks. Needless to say, these other freaks are not shown here.

DESIGN 2, 1954, *Diagram* 31:

This design was partly influenced by E. Welbourne's design in diagram 37 and Ray Monks' *Quickie*, but it did represent some original thought. Pete Holland's airfoil from *PAA Packet* was employed and very useful it proved subsequently. Proportions were of the usual low aspect ratio British layout of the time and the only real virtue the design had to recommend it, was consistency allied with reasonable performance. Stability of this, and design 3 was not as expected due to poor airfoil matching.

The side area disposition/dihedral form layout were not perfect but provided a fairly safe model. Note that the wing surface was interrupted by spars, a feature conspicuous by its absence on most high performance models; for proof of this, refer to the 29 described previously.

While possibly the slight sag incurred by having no support between leading edge and trailing edge, may not be all that serious in most applications the disturbance of spars on A/2's with the sections the writer has used has been found to affect performance detrimentally Yes, we know that in certain applications spars are deliberately made to interrupt the front upper surface, but note: only in certain applications!

DESIGN 3, 1954, *Diagram* 32:

The realisation came with this design that slim profile fuselages could be used successfully. By comparison with Design 2 the moment arm was shortened slightly and the fin was put in a rearward position. Wing and tailplane used the 3-spar construction, which was to become quite popular with Eric Welbourne and myself. The author's sliding towhook idea for operating the auto-rudder came into being with third model and has been used on every one since.

DESIGN 4, 1954, *Diagram* 33:

Here, a style was set, the pure stick fuselage. The wings used were those from Design 2, made into one piece with the centre panel dihedral removed. Apart from the "I" spars in the wings, simplicity could probably not have been bettered. This was the author's first model to employ an undercambered tailplane section, and the tailplane area was at the same time increased to 100 sq. in. from the previous 80 sq. in. Generally, this model was a vast improvement on previous designs especially for stability. It also proved that a very small side area is perfectly adequate under certain conditions of design as the model behaved well at all times. It was capable of 2 : 15 in "still air".

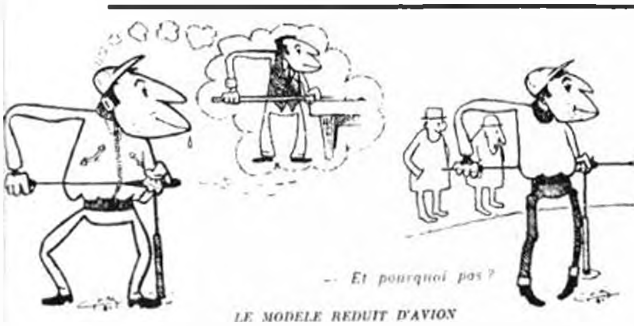
ESIGN 5, 1955, *Diagram* 34:

Around this time *Shorty* was published. Here were a pair of airfoils which would probably give a better sinking speed than those which had previously been used. Not being content to use them as they were, however, modifications were incorporated with the hideous results shown! Proportionwise the model was an orthodox development of Design 4, in that it had higher aspect ratio, a longer moment arm, an ultra short nose, etc., but it also employed end plates and quite a large side area. Had better airfoil sections been used, *e.g.*, the original Hancock *Shorty* airfoils, the model would probably have been quite good. However, it proved inconsistent in wind, although quite good in calm. The end plates had no noticeable effect but were very small. A wing spar layout the writer was to use a lot on later models, was employed for the first time.

WANDERER, 1955, *Diagram* 35:

This followed the style set by Design 4, but had the higher aspect ratio of Design 5; the tailplane aspect ratio was also raised. Use of radiused tips was felt to be a great improvement and the writer still feels this to be the best all round answer to tip shape. The wing airfoil used was that of Hancock's *Shorty* in a little modified state, but the tailplane airfoil was a sketched original. At the time, everyone was inertia conscious and cut airframe weight to a minimum with the idea of concentrating weight in the form of ballast. While the reduction of inertia to a fantastic degree is not necessarily desirable, as has been subsequently realised, this was achieved here and had no ill effects. The wings weighed 3 ozs., the tailplane ½ oz. and the fuselage 1 oz.! This left 10 ozs. out of the 14½ ozs. A/2 weight for ballast! Surprisingly enough, the wings never folded in the whole career of the model.

The still air performance quoted at the time was 2 mins., but to be consistent with other "still air" times quoted (in Parts 1 and 2 as well), which were really normal evening air times, the performance could be said to be around 2 : 30.



Apt comment on the new F.A.I. speed handle for Monocable control, from our French contemporary

CONTEST GLIDERS (cont.)

MEANDERER, 1956, *Diagram* 36:

The exhibitionist in me now came to the forefront and I decided to build a large glider. It was similar to *Wanderer*, using similar airfoil sections and construction but, as can readily be seen from the illustration, had a higher aspect ratio. Apart from this and the addition of centre panel dihedral with wing panels of equal length, it was a scaled up *Wanderer*. It proved to be an improvement in all respects, had a few contest successes and was published by AEROMODELLER in February, 1958.

Due to the basic effect of scaling up, *i.e.*, *2 x length means 8 x volume*, the disposition of weight was less favourable, *e.g.*, wing weight 9 ozs. for total weight of 23 ozs. This effect has plagued the writer with large gliders; if one has strong wings the weight is excessive, if they are light they break easily. The answer lies in a hybrid balsa and hardwood construction with a very large glider.

In other people's hands the only success the writer knows of is that one placed 2nd in the 1960 Nationals Glider Fly-Off. It was felt eventually that lack of side area, especially in the fin had been taken too far with this design and *Wanderer* as the models, once in a while, would execute the most peculiar phenomena which could only be traced to side area stalling or possibly only auto rudder stalling. The C.G., airfoil, longitudinal dihedral and layout proportions would seem to be reasonably co-ordinated on this design as it was neither over nor under-stable. The still air time had now been raised to 2 : 35 or more accompanied by greater susceptibility for thermals, especially in evening conditions.

MITZI by E. WELBOURNE, 1956, *Diagram* 37:

This design has been included because it had progressed, in parallel with the writer's own glider designs until Eric Welbourne gave up modelling in 1956. He was the only other Hayes Club member to develop an A/2 design and his development which usually led the writer's, had begun about 1950. The version shown was not the last, but was the best tried and had several successes in rallies and could be counted on to perform well in Eliminators. The tailplane area was 90 sq. in. and the moment arm longer than the writer had so far used (compare with Designs 3 and 4). Wing section was virtually Pete Holland's and the tailplane section was a sketch.

The one later version than that shown had shaped wing tips (circular) and a consequent increase (slight) of wing chord it also employed a different, thinner, wing section with much built-in droop. Performance was comparable.

The only shortcomings of the design were firstly, that it had a tendency to tow over to one side or the other, which was not caused by incorrect hook position, but was easily corrected. Secondly, it would only very occasionally, spiral in for no apparent reason. The writer can only think of one possible reason for this, that of side area disposition, which will be dealt with in later parts. The "still air" performance was always slightly better than that of the writers' comparable version of the time and was probably around 2 : 35 to 2 : 40. Note that spars interrupting the surface were still retained on this design, while the writer changed over to sheeted leading edges at Design 5.

DESIGN 9, 1956, *Diagram* 38:

This peculiar design was inspired (?) by Lindner's *Spinne*. It was an interesting break away from usual practice, but I don't intend going back to it. The short nose of *Shorty* was used and wing fixing was a developed form of that used on *Quickie* otherwise, the dihedral form and fin layout were borrowed from Lindner and the proportions were those of a *Wanderer* with a longer moment arm. A torsion spring auto rudder was used. The wing and tailplane sections were most peculiar and bear some resemblance to Benedek's latest B.8556b which believe it or not, is purely coincidental as mine were designed first. They were actually concocted by plotting an N.A.C.A. fairing about an arc of circle mean line.

This design put the writer off straight dihedralled wing for gliders forever, as it did not always behave on tow. The sympstom was a persistent bias to one side despite all measures being taken to correct it although it could usually be coaxed to the top of the line and luckily the bias was with glide turn. Had not excessive dihedral been used the glide would probably have been troublesome, especially with an underfin only, but it circled very tightly (15-20ft. dia!) with the inboard wing panel horizontal, but perfectly safely. Generally, still air performance was equal to that of any predecessor, apart from *Meanderer*, and stability was quite good. It was entered in only one contest, an eliminator in Spring, 1956, and placed 2nd in the Area, 5th in the Country, with 12 : 00 total, all flights but one being D/T'd but was never again to behave so well.

DESIGN 10, 1956, *Diagram* 39:

This was an attempt to achieve a rough weather model—it was a failure.

With such a short model using such dissimilar airfoils, the C.G. should have been at about 40 per cent. instead of 55 per cent. The wing airfoil was a slightly modified Davies A = 93 B = .17 and the tailplane airfoil was sketched. As it was, with the underslung auto rudder it was hopelessly inconsistent in rough weather. In calm air it would make around 2 min. for obvious reasons. Had the C.G. been at 40 per cent. it would probably have served its purpose admirably.

The wing construction would have been phenomenally strong, as it was intended to be, had dihedral braces been used at the centre, especially as two hardwood spars were used. The lack of strength at the centre of the wings gave it one claim to fame when the wings parted neatly on tow and the fuselage just missed a little gipsy girl at Chobham Common, to stick, quivering, in the ground! The quest therefore continued.

DESIGN 11, 12ft. GLIDER, 1957, *Diagram* 40:

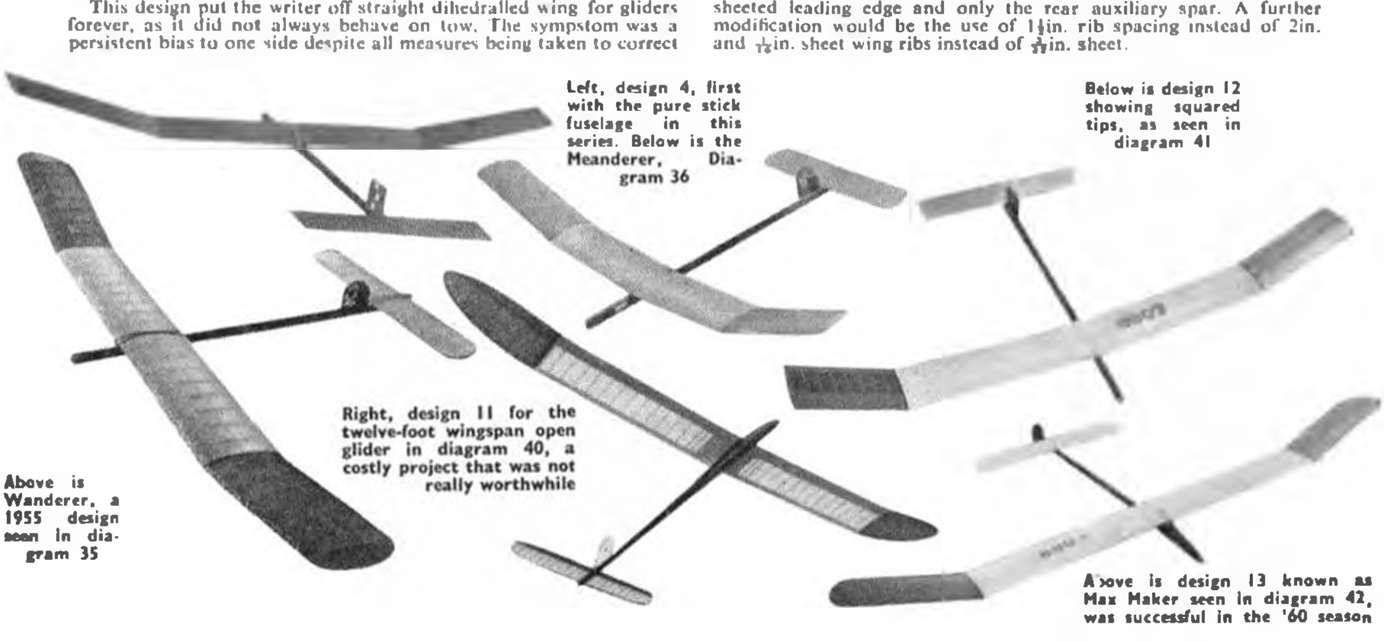
Here was an expensive experiment. Proportionwise it was too stable; a shorter moment arm would have improved it. The airfoil sections were sensible. Its real downfall came constructionally. The centre sections were so heavy by using the 1/8in. sheet torsion box arrangement that the wings accounted for half of the total weight, *i.e.*, 2-lbs. out of 4-lbs.! This gave rise to considerable inertia, which did not improve stability. Use of single covering on top and double-covering on the bottom led to much warping trouble. Top sheeting was only used on the tips and apart from being weak they warped badly. A better wing construction will be seen on later large gliders. Overall result of this was that the model stood no chance of performing reasonably and was merely a waste of £6 and two weeks hard labour, although it did look pretty!

DESIGN 12, 1959, *Diagram* 41:

Two of these were built and were excellent performers, although they did not get much chance to show what they could do in open competition as they were both lost in rapid succession. One did make the fly-off at the 1959 South Midland Gala and was afterwards found to have been flown under elevated by 1/16in. of tailplane packing for most of its career! Such was its insensitivity. An aspect ratio of 12 was used along with a high aspect ratio tail of area 96 sq. ins. moment arm of four chords C.G. of 50 per cent. and well matched airfoils. The tailplane was kept light (3/4 oz.) and the fuselage was merely a 3/4in. square box of 1/16 in. sheet tapered at the rear end.

Wing section was the writer's power model airfoil and the tailplane section was sketched. The wing construction was the first where the writer aimed at great flexibility and used mainspars one above the other, a system the writer has used much since, with great strengthening at the centre in the form of dihedral braces. Auxiliary spars were soft and merely there for covering support.

The wing of one did break once, but it took a lot before it did, and had the mainspars been 1/8in. square hardwood instead of 1/8in. x 1/4in. balsa, this would not have happened. "Still air" performance as near as could be estimated was in excess of 2 : 30. I shall probably build another some time as an experiment, but with 1/8in. square hardwood (spruce) spars instead of the 1/4in. x 1/8in. balsa main spars, a 3/32in. sheeted leading edge and only the rear auxiliary spar. A further modification would be the use of 1 1/2in. rib spacing instead of 2in. and 1/16in. sheet wing ribs instead of 3/32in. sheet.



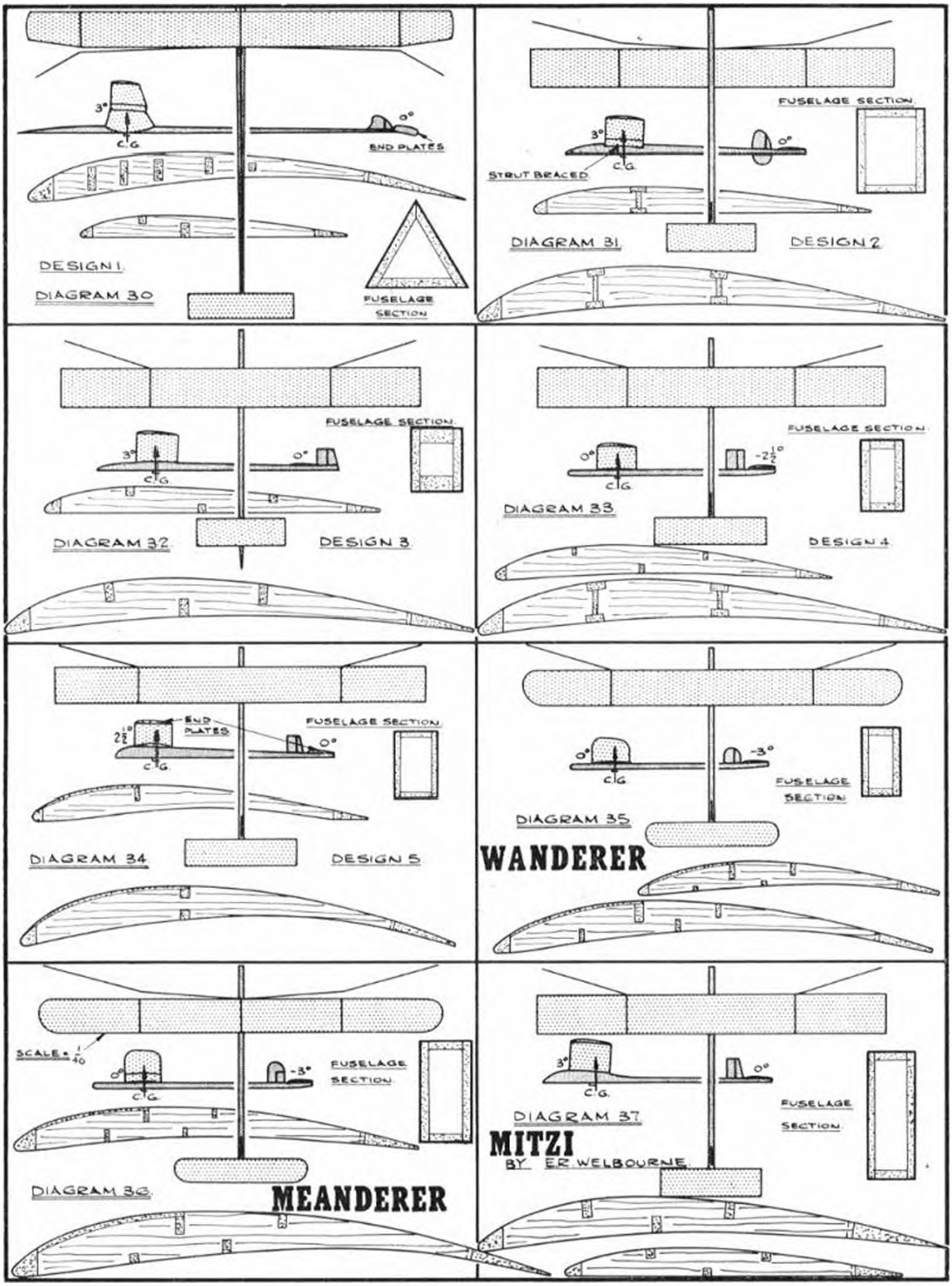
Left, design 4, first with the pure stick fuselage in this series. Below is the Meanderer, Diagram 36

Below is design 12 showing squared tips, as seen in diagram 41

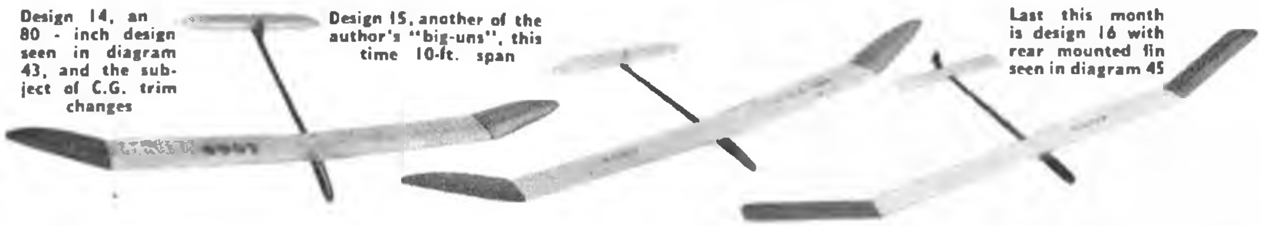
Right, design 11 for the twelve-foot wingspan open glider in diagram 40, a costly project that was not really worthwhile

Above is Wanderer, a 1955 design seen in diagram 35

Above is design 13 known as Max Maker seen in diagram 42, was successful in the '60 season



ALL DRAWINGS ARE TO A COMMON SCALE FOR SIZE COMPARISON
EXCEPT MEANDERER AS NOTED


Design 14, an 80 - inch design seen in diagram 43, and the subject of C.G. trim changes

Design 15, another of the author's "big-uns", this time 10-ft. span

Last this month is design 16 with rear mounted fin seen in diagram 45

CONTEST GLIDERS (cont.)

DESIGN 13—MAX MAKER, 1960, *Diagram*, 42:

An attempt was made here to improve on *Meanderer* contestwise, accepting if unavoidable, a slight loss of still air time. Even greater simplicity of construction and cheapness were also major factors. It succeeded. Same overall proportions were used, but tip dihedral replaced polyhedral for both towing and simplicity considerations, while side area was increased at the fuselage front and a larger rear fin was used to eliminate the previous side area and auto rudder stalling effects. An orthodox thickish wing section was used in place of the previous "Shorty" section and a flat undersurfaced tail used in place of an undercambered section. As a result of this last manoeuvre, stability would have been impaired longitudinally had the C.G. not been pushed forward to 45 per cent. and accompanied by an increase of longitudinal dihedral to 4 degrees.

Constructionally appreciable modifications occured. The tailplane was slightly lighter and had a different spar layout. The wings had hardwood spars placed one above the other with one stiffening auxiliary spar on the upper surface and the trailing edge was slightly reduced. One very desirable feature of the two spars one above the other is the ease with which a tongue can be incorporated. A tongue box is formed merely by adding ply to the spars, each side, between the ribs after removing the ribs from between the spars thus forming a complete hardwood box section. The fuselage was still a simple box construction, but with $\frac{1}{16}$in. sheet sides was not sufficiently torsionally rigid and occasionally led to slight trouble on tow. This trouble has been rectified on plans distributed by the writer (post paid 7s. 6d. each) by the use of a ⅛in. sheet box construction.

It is felt that the frontal side area may be more than is necessary, but it does not seem to have caused the effect the writer suspected, oscillation on tow due to a low hook position. Built at the beginning of the 1960 flying season the design was only fully tested quite late in the season. After several spoilt full houses by early D.T'ing, it finally collected quite a bevy of 1st's and 2nd's at the end of the 1960 season. Although it will only make 2 : 30 in "still air" conditions it is an exceptionally reliable design giving adequate indication when in lift and will usually hit lift when any is around.

DESIGN 14, 1960, *Diagram* 43:

Intended logical development of Design 12 was Design 14. Elliptical tips replaced square tips. Span was increased from 72in. to 80in. and tailplane area was reduced to 85 sq. ins. with consequent slight increase of moment arm from 24in. to 26in. Construction was modified appreciably mainly by the introduction of sheeted leading edges to the wing and tailplane. A possible downfall was the use of different airfoil sections with no real motive as the originals had been quite satisfactory.

Two were built, one by the writer and one by a clubmate, Brian Chapman. The writer's version started off with a 60 per cent. C.G. and 2½ degrees longitudinal dihedral and showed obvious signs of lack of stability through the tailplane being too heavily loaded. The C.G. was put forward to 45 per cent. after much waste of time, and this was where the writer first encountered a model suffering from too much stability. It would glide around quite happily for a while, but even in a calm would sooner or later break off into a series of stalls from which it sometimes pulled out, but more often did not. Obvious reason for this was that the C.G. was at this stage taken too far forward and the model had now become, for want of a better description, "too stable". Brian's model, on the other hand, was far better. On tow it was more stable, possibly partly due to greater tip dihedral. The C.G. was in the intermediate position and the model behaved quite well.

DESIGN 15, 10ft. GLIDER, *Diagram* 44:

Design 14 was scaled up 1½ times in length to give Design 15. Only differences were that the structure was not perfectly to scale, the tip dihedral angle had been increased and the wing and tail airfoils were the airfoil originally used on design 12. The C.G. was placed at the suspected ideal position just after of 50 per cent. and longitudinal dihedral corresponding to this was 3 degrees. A sensible construction was used throughout; the main problem on a large glider, that of wing construction was solved by the hybrid balsa and hardwood construction, but this did not save the outer wing when the model D.T'd onto a tip. Weight was 36 ozs., of which the wing was about 10 ozs. This is felt to be a good practical compromise as it gives the same area loading as a 16 oz. A/2, whereas by the volume ratio, had it been faithfully scaled the weight would have been 14.5 x $(1\frac{1}{2})^3$ = 49 ozs.! It is thus easy to see why large models are inherently either more fragile or heavier.

In practical competition it does not seem to be as good as Design 13, despite a "still air" performance of around 2 : 45 or more, as it seems less susceptible to lift.

DESIGN 16, *Diagram* 45:

Here, the proportions stated at the end of Part 2 were put to use. The only peculiar feature aerodynamically is the writer's preference of a rear mounted fin. Airfoil sections are nearly identical and are fairly conventional except for the writers characteristic blunt leading edge and the use of a finite trailing edge thickness. The latter is felt to be of no consequence in affecting performance as the airflow should normally leave the upper surface long before the trailing edge is reached. It does, however, improve matters constructionally.

Tailplane is a conventional 3-spar type. The fuselage construction is the writer's usual ¾in. square box of $\frac{1}{16}$in. sheet with taper widthwise at the rear end, the only failure of which has been when a power model went right through the model on the climb! Wing construction is most unusual and fairly simple. The ¼in. square hardwood spar tapers to ⅛in. deep by ¼in. wide at the dihedral breaks and from there continues as ⅛in. by ¼in. balsa. This provides a remarkably flexible wing. The first one used an Obechi spar and did break when a winch jammed in a howling gale. The second one used a spruce spar and is virtually unbreakable even when an extra 6in. or so of dihedral have been flexed into the wing!

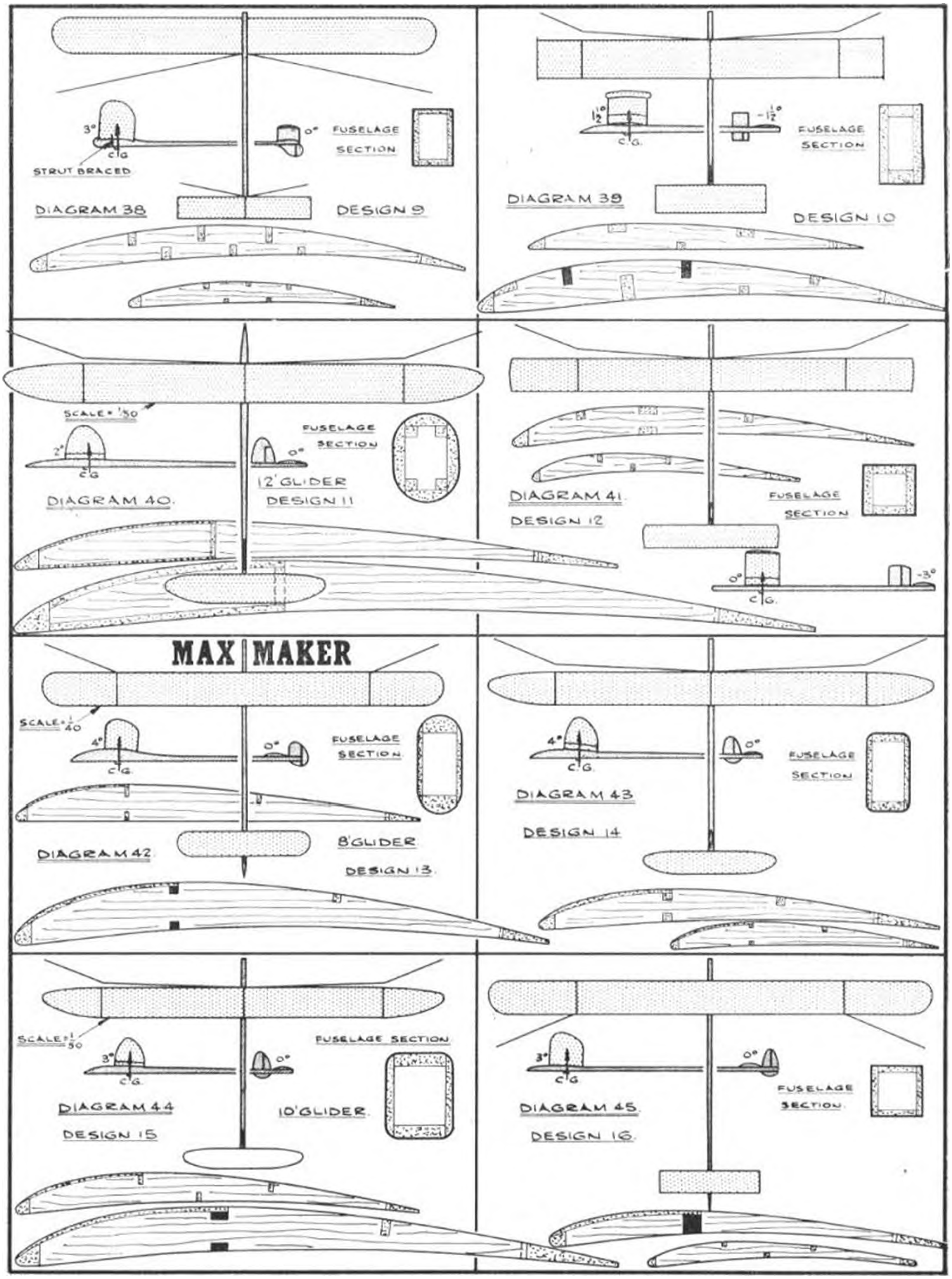
Bad turning characteristics were traced to insufficient rear fin area, which was cured by the addition of the underfin. This increase of fin area sometimes causes the model to veer to one side if it overtakes the tower, but *only* if it overtakes the tower. The second model suffered from having the C.G. too far back (60 per cent.) and subsequent shifting proved that 50 per cent. was a reasonable position and certainly no further back than 55 per cent. Due to this, the second model has a nose length twice that of the first to keep it to a reasonable weight as its rear end had been built slightly heavier Stability is almost as good as that of Design 12 and the "still air" performance as near as can be judged, is in excess of 2 : 45 with the limited flying in calm conditions as yet done. I don't think this is a "final answer" either, but it is probably quite a good one.

While this model development was going on, I had been developing my own ideas on thermal hunting, which began to bring results with *Max Maker*. The best designs developed were 12, 13 and 16, on which my hopes for the present season are based. The way I have hopped from one design to another probably brands me as an idiot, but at least I have a varied experience of many types of design and feature, several of which are not shown here.

So far, three sections have been devoted to criticism of designs which, apart from refreshing history and guiding the reader along the writer's trend of thought, have not been very constructive. They have, however, paved the way for the remaining sections and will also have presented some models to the reader in a way he has not seen them before, *i.e.*, a mass comparison.

The following parts, 4 and 5, will deal with gliders aerodynamically and should give the reader something to think about and also explain some of the wild statements made in Parts 1, 2 and 3.


"These unlimited open events are all very well but I want my dinner"

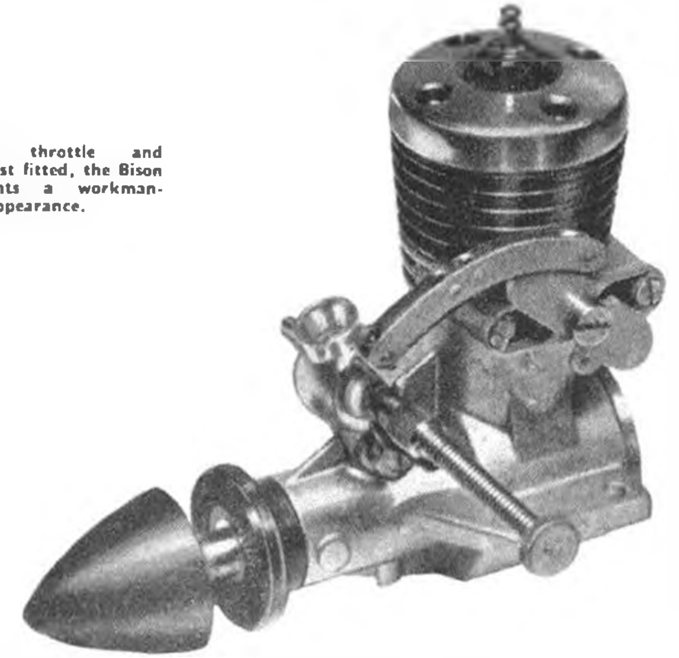


ALL DRAWINGS ARE TO A COMMOM SCALE FOR SIZE COMPARISON EXCEPT DIAGRAMS 40, 42, 44 AS NOTED

A TYPICALLY THOROUGH engineering job, as is only to be expected from a German manufacturer, the 3.6 c.c. "Bison" fits a popular control line and radio control demand and is supplied with a throttle unit with the latter use in mind. Of orthodox design and construction, the "Bison" proved to be an exceptionally easy engine to handle whilst at the same time capable of a good power output, peaking at just over .3 B.H.P. at 13,000 r.p.m., which is a moderate performance for a long stroke engine of this type and size (actually considerably oversize from the nominal 3.5 c.c.).

Probably the most likeable characteristic is that although it is a 3.5 c.c. engine it could equally well be rated as "suitable for beginners" for ease of starting, following either finger choking or priming through the exhaust. Its least attractive feature is its tendency to vibrate quite badly at all load speeds, particularly in the 10-13,000 r.p.m. range, where it would normally be employed for radio control work. Although a slow motor, we estimate its vibration to be at least as much as any 3.5 c.c. diesel, and probably more.

With throttle and exhaust fitted, the Bison presents a workman-like appearance.



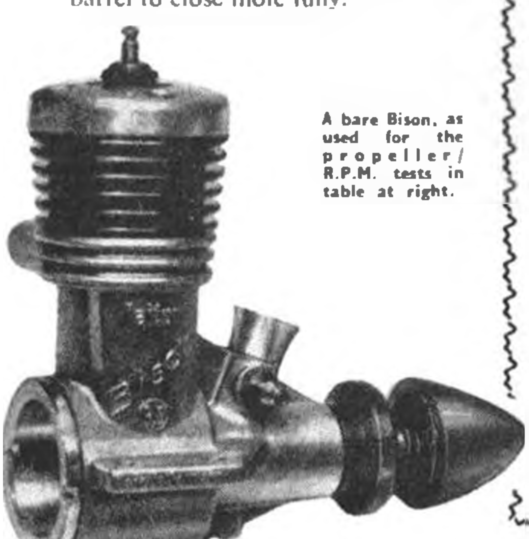
ENGINE ANALYSIS No. 83 by R. H. Warring

Two throttle equipped engines for R/C

The throttle unit comprises a conventional barrel fitted around the spraybar in a spherical "swelling" on the intake tube, this complete unit plugging into the stub intake in the crankcase casting and securing with a screw. For ordinary running it can be replaced by a short venturi insert held in place by the spraybar assembled through the hole in the stub intake. The lever connecting to the barrel throttle is linked to a pivoted exhaust blanking plate which rotates to shut off the exhaust opening completed in the "closed throttle" position. The linkage is well engineered and positive in action with minimum friction. "Low throttle" position is given by forward movement of the linkage which brings it extremely near the propeller arc—only just missing. In the most forward position, too, the barrel is far from completely closed, accounting for the rather high "low speed" r.p.m. figures. We found that the throttle control gave a reduction to speed from 10,000 to 6,000 r.p.m. with a Frog 9 x 6 nylon propeller; and from 12,500 to 6,500 with a Frog nylon 8 x 4 propeller. Lower speeds could only be achieved by "mutilating" the linkage to get the barrel to close more fully.

Most response to throttle came over the latter part of the movement and was quite smooth. Pick up from low to high speed again was fairly rapid, but with a certain hesitation, whilst the mixture readjusted itself after running for any time in the "low" position. Running was strong and consistent at "low" setting, but the speed was fairly high and the low speed mixture relatively lean.

For normal high speed running, fitting of the throttle produced a penalty of 600 r.p.m. at 10,000 r.p.m. and approximately 1,000 r.p.m. at higher speeds. Corresponding r.p.m. figures for the two propellers mentioned above, running with the short venturi insert replacing the throttle unit and conventional spraybar were: 9 x 6—10,600 r.p.m.; 8 x 4—13,600 r.p.m. All power test figures were conducted with the basic arrange-



A bare Bison, as used for the propeller/R.P.M. tests in table at right.

TAIFUN BISON 3.6 c.c.

PROPELLER—R.P.M. FIGURES

dia. x pitch		*r.p.m.*
9 x 6	Frog nylon	10,600
8 x 4	Frog nylon	13,600
8 x 4	Top Flite nylon	14,400
8 x 6	Top Flite nylon	11,300
9 x 4	Top Flite nylon	12,100
9 x 6	Top Flite nylon	10,000
10 x 3½	Top Flite nylon	10,300
9 x 4	K-K nylon	12,500
9 x 6	K-K nylon	9,500
8 x 6	K-K nylon	12,000
8 x 4	K-K nylon	14,200
9 x 6	Semo nylon	10,200
9 x 4	Semo nylon	11,400
8 x 6	Semo nylon	10,300

Fuel used: standard glow fuel mixture plus 7 per cent. nitromethane.

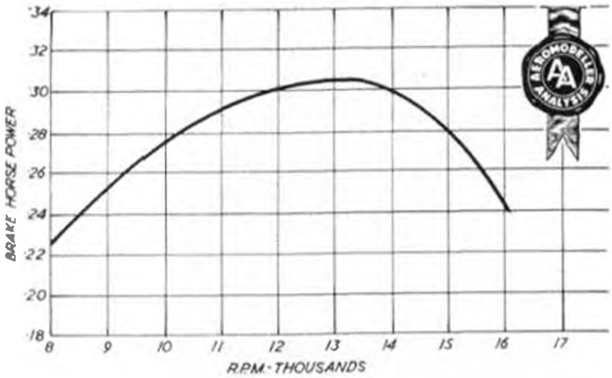
Note: all propeller r.p.m. figures quoted are for the "Bison" running with normal intake tube and spraybar.

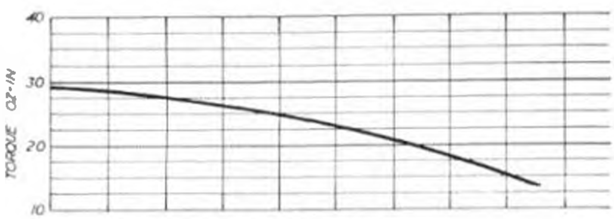
SPECIFICATION

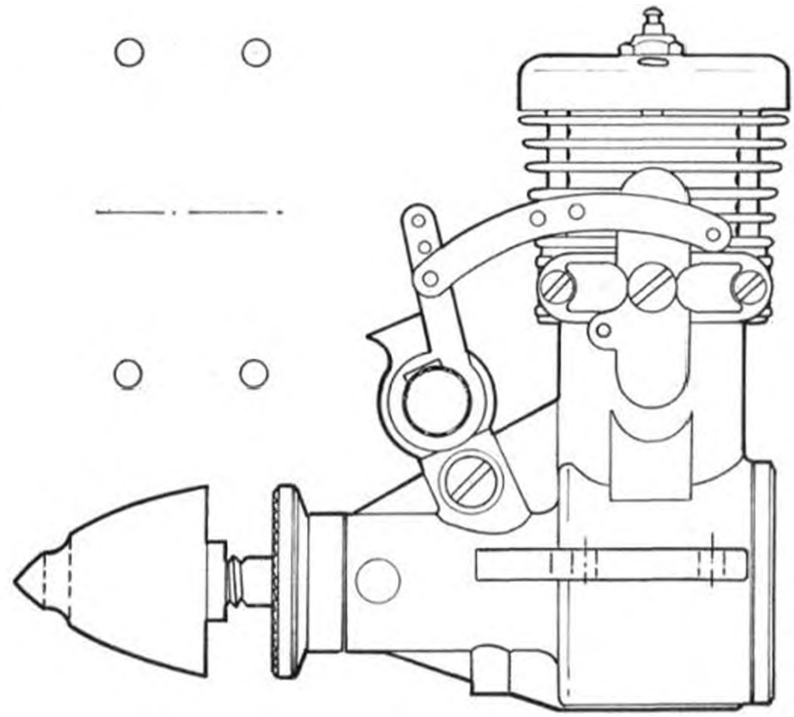
Displacement: 3·629 c.c. (·2214 cu.in.)
Bore: ·631
Stroke: ·708
Bore stroke ratio: 0·89
Bare weight: 6 ounces
Max. Power: ·304 B.H.P. at 13,300 r.p.m.
Max. torque: 30 ounce-inches at 7,500 r.p.m.
Power rating: ·084 B.H.P. per c.c.
Power/weight ratio: ·0507 B.H.P. per ounce

Material Specification:
Crankcase: light alloy pressure die casting
Cylinder: mild steel (unhardened)
Cylinder jacket: turned dural anodised black
Cylinder head: turned dural, polished
Crankshaft: hardened steel, 6 m.m. DIN propeller shaft thread
Connecting rod: light alloy forging
Piston: cast iron
Spraybar: brass
Throttle unit: brass spraybar and barrel throttle; brass linkage to pivoted exhaust cover plate
Propeller driver: dural, anodised black (collet fitting)
Back cover: turned dural
Spinner nut: turned dural, anodised black

Manufacturers:
Johannes Graupner, Kirchheim-Teck W. Germany







Power curve and actual size drawing

ment and thus the throttled engine could be expected to give an appreciably lower performance, particularly at the high speed and probably peaking at around 11,500-12,000 r.p.m.

Constructionally the "Bison" features a substantial die-cast crankcase unit incorporating the low cylinder housing and stub exhaust on the post side. The mounting lugs are very strong and carried round the front of the crankcase. The transfer passage, opposite to the exhaust is cast in leaving a relatively large passage outside the cylinder liner. Provision is made to drill and tap a "slug" in the bottom of the crankcase under the shaft port for port-controlled pressure take-off.

The cylinder liner is of soft steel, plain in shape with a small flange at the top. Exhaust and transfer ports are cut through the walls, diametrically opposed, the transfer overlapping the exhaust by approximately 70 per cent. The fins are a separate light alloy turning, anodised black and simply sliding in position up the outside of the cylinder. Small nicks on the top flange of the cylinder act as location marks to align the cylinder relative to the holes bored in the jacket for the holding down screws and, in fact, are actually necessary to clear the screws. This does appear a rather unnecessary complication on a mass production job.

The cylinder liner is finished by grinding all over and the bore is finally finished by honing. The piston is of cast iron, ground to finish, and is purely cylindrical in form with a flat top and simple flat plate deflector on the transfer side. Walls are left relatively thick and the piston is a little on the heavy side. The .157 in. diameter fully floating gudgeon pin is hollow and fitted with aluminium end pads. The size of hole drilled through the gudgeon pin is so small that there is virtually no weight saving in making it hollow and so presumably the main reason for making the pin hollow is to accommodate the end pads.

The cylinder head is turned from dural with a plain (unfinned) top and incorporates a contoured combination chamber top. The glow plug is centrally located and of conventional form, with a 1½-volt element.

The connecting rod is a very nice light alloy forging, quite light yet exceptionally rigid. Big and little end bearings appear to have been reamed and honed and are a very good fit without "rock" on the crankpin and gudgeon pin, respectively.

The crankshaft is ⅜ in. diameter stepping down to .256 in. diameter in front of the bearing and then cut with a 6 mm. DIN thread (.232 in. diameter). The intake port is rectangular in shape. The thick web incorporates a counterbalance, whilst the .215 in. diameter crankpin is drilled through. The shaft is hardened and ground between two centres over both diameters. The crankpin is also ground to finish.

The main bearing consists of a substantial bronze bushing inserted in the crankcase casting, this bush having a wall thickness slightly over $\frac{1}{16}$ in. A narrow oilway is channelled down the bearing for about one half of its length, whilst notches at the end of the bush provide oil entry ways.

The dural propeller driver is fitted on a split collet to locate on the front diameter of the crankshaft. A spinner nut is employed, with a protruding spigot slightly over $\frac{1}{16}$ in. diameter calling for propeller hubs to be drilled out—a feature we always view with some disfavour.

The back cover is a simple dural turning which screws into the back of the crankcase, sealing against a thin gasket.

Workmanship throughout is first class, with an excellent piston-cylinder fit but, rather surprisingly, a very slack fit on the main bearing equivalent to a substantial clearance at the front end. This is not harmful and in view of the fact that the bearing itself is bushed should not affect the life of the bearing. The shaft, in practice, only really "rubs" at each end of the bush.

Summarising: a very pleasant engine to handle and one which gives a consistent, good power performance without being outstanding in this respect. The vibration level is high and the engine itself a little on the heavy side—but it is really robust and well built.

VECO 19 R-C

Propeller—R.P.M. Figures

dia. x pitch		*r.p.m.*
8 x 4	Frog nylon	14,400
9 x 6	Frog nylon	11,200
10 x 6	Frog nylon	9,000
10 x 3½	Top Flite nylon	11,000
9 x 4	Top Flite nylon	13,000
9 x 6	Top Flite nylon	10,400
9 x 4	K-K nylon	13,450
9 x 6	K-K nylon	9,600
10 x 6	Trucut	9,000
10 x 4	Trucut	10,000
9 x 4	Trucut	12,800
9 x 4	Semo nylon	11,800
9 x 6	Semo nylon	10,900
8 x 6	Semo nylon	10,900
8 x 4	Semo nylon	13,000

Fuel used: standard glow mixture plus 7 per cent. nitromethane.

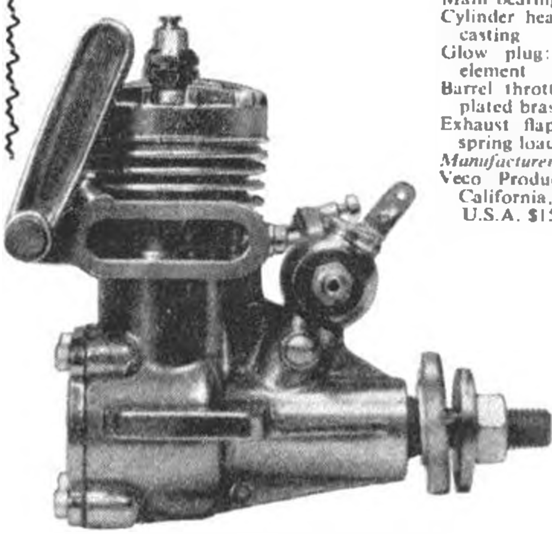
Specification

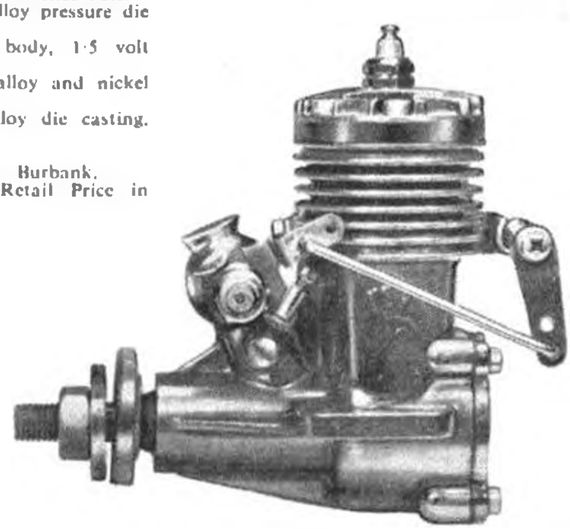
Displacement: 3·272 c.c. (·1995 cu.m.)
Bore: ·634
Stroke ·632
Bore stroke ratio: 1·0
Bore weight: 6 9/16 ounces
Max. power: ·395 B.H.P. at 14,000
Max. torque 30 ounce-inches at 9-10,000 r.p.m.
Power rating: .11 B.H.P. per c.c.
Power/weight ratio: .055 B.H.P. per ounce

Material Specification:
Crankcase: Light alloy pressure die casting
Cylinder liner: soft steel
Piston: hardened steel
Crankshaft: hardened steel
Connecting rod: light alloy pressure die casting
Main bearing: phosphor bronze bush
Cylinder head: light alloy pressure die casting
Glow plug: ceramic body, 1·5 volt element
Barrel throttle: light alloy and nickel plated brass
Exhaust flap: light alloy die casting, spring loaded

Manufacturers:
Veco Products Corp., Burbank, California, U.S.A. Retail Price in U.S.A. $15·95.

Views of each side of the Veco 19 R/C illustrate the wealth of thought applied to the design of what is a most effective control system. Throttle has a screw stop adjuster for slow speed setting



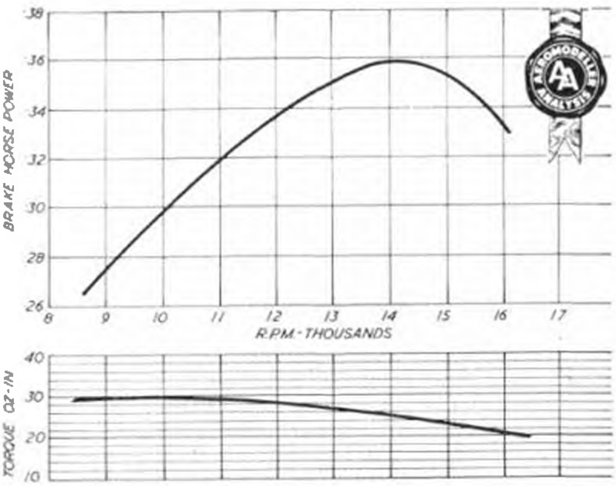


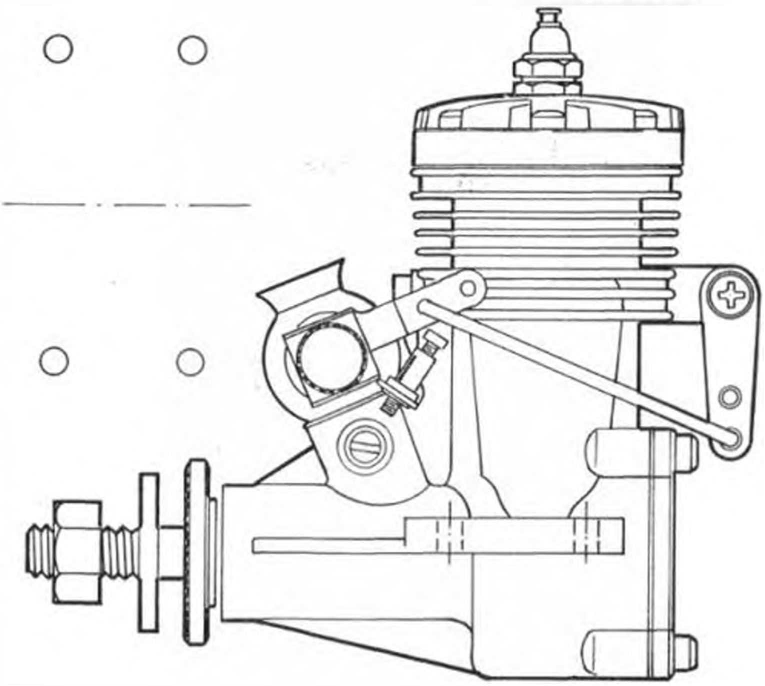
The Veco 19 R/C embodies the standard "19" production with the addition of a barrel type throttle linked to an exhaust flap. It is an excellently engineered job throughout with a particularly interesting and robustly practical throttle mechanism. The pivoted exhaust flap is mounted on a casting which fits over the standard stub exhaust and is locked in place with two screws piercing the original stub. The flap itself is controlled by a wire link to the throttle arm in the conventional manner and is tensioned inwards, to press against the exhaust opening, with a light spring. In the fully closed position the flap actually oscillates slightly, although this is not apparent by looking at it, the pressure of the exhaust gases periodically lifting the flap against the spring. Thus although the flap fully closes the exhaust port it does not prevent escape of gas when pressure builds up. Slow running is very smooth and the only way to stop the engine in this condition, other than closing the needle valve, is to press the exhaust cover tightly against the stub exhaust.

Starting and general handling characteristics of the Veco "19" R/C are really excellent—first flick starting virtually every time following choking, hot or cold. Running is consistent at all load speeds, without any hesitation of falter and everything about the engine is easy to handle. Compression is excellent without the slightest sign of tightness and the main bearing fit free from slop. Performance, too, is in the "hot" class. The test motor showed a peak of just under .36 B.H.P. at 14,000 r.p.m. and was still extremely happy running at much higher speeds. The only part of the speed range in which it could be regarded as not completely satisfactory was around 10,500 r.p.m. and below when it was definitely beginning to blow back through the intake and not quite as smooth as it was at higher speeds.

The throttle is of the conventional barrel type except that the barrel is rigidly connected in the spraybar so that both rotate together. This means, of course, that the fuel tubing is twisted and displaced with movement of the throttle and so needs some "slack" to accommodate this movement. It appears to be an entirely satisfactory arrangement provided the fuel tubing remains flexible (e.g. using neoprene tubing). With the type of tubing used in this country the stiffening which occurs with age could offer awkward resistance to throttle movement and possibly cause some trouble.

Low speed r.p.m. is approximately 3,000 with the throttle fully closed (i.e. stop screw adjusted to correspond to complete blanking off of the exhaust) with propeller loads corresponding to 11-12,000 r.p.m. on full throttle. Running is very strong in the closed throttle position and pick-up positive, if not instantaneous. Opening the throttle produces an immediate increase in r.p.m. but with the engine four-stroking and it takes a second or so to clear to normal two-stroke running. We also found it possible to cut the engine by opening the throttle rapidly—far more rapidly than it would normally be opened by a servo or actuator. Probably this is because sudden opening results in excessive cooling of the plug. Still lower slow running speeds can be achieved by increasing the spring tension on the exhaust flap and 2,000 r.p.m. can be held from around 11,000 r.p.m.





Power curve and actual size drawing

Running however, is not so strong and 3,000 r.p.m. appears a minimum safe idle speed and one which should be entirely satisfactory in service.

Many of the constructional features of the Veco "19" are most interesting. It features the much advertised "Temperature Controlled Clearance" which, in effect, can be taken to mean that the parts that really matter are produced under controlled ambient temperatures so that specified tolerances are absolute. In other words, it obviates the effect of, say, producing one part of one temperature to a specified tolerance and another part at another workshop temperature to its specific tolerance. If the two manufacturing temperatures are different, consequent expansion or contraction of the components at a common temperature (when brought together) can upset the "fit". Commonly it is necessary to work to wider tolerances to take this into account. Produced under proper controlled conditions, closer tolerances and better fits can result. The sceptics can write "T.C.C." off as an advertising gimmick but the principle as applied is sound, modern engineering practice—and the best possible way of producing close matching components. Not only that, we envy Veco the machines they must have to do such a first rate job of production. They are undoubtedly way ahead of those normally employed in this country.

The crankcase unit is a first class pressure die-casting in the usual American style which appears to have been wet tumbled to finish. A certain amount of machining is done on it to finish, the lower cylinder sized on a fine boring machine (or similar) so that the cylinder liner is almost a "piston" fit. A fillet is also machined out on the exhaust side to clear the connection rod and the top of the casting faced.

The soft steel cylinder liner has a substantial wall thickness—.75 in. overall diameter for a bore of .634 in., finished by grinding outside. The method of arriving at the bore finish cannot be determined by examination. The surface finish is comparatively rough and carries marked scratching (including a scratch made by the gudgeon pin), but the liner-piston fit is excellent. A peculiarity of the liner is that there are no sharp edges (except on the rectangular exhaust and transfer ports milled directly through the walls) giving the impression that the unit has either been tumbled before finish machining, or possibly it is an investment casting.

The piston is machined from steel, leaving very thin walls below the gudgeon pin seating and incorporates a filleted-in deflector plate. The bottom of the piston is generously relieved. A small hollow gudgeon pin is employed, .156 in. diameter, and fully floating. The piston is hardened and then relieved by heat treatment to give only moderate final hardness. The connecting rod is a pressure die-casting in light alloy with a bronze bushed big end.

The crankshaft is of steel, .4065 in. diameter stepping down via a short taper length to a $\frac{1}{4}$ in. diameter front length threaded $\frac{1}{4}$ A.N.F. The large rectangular port opens into a 9/32 in. hole through the centre of the shaft. The shaft is very hard—which is rather unusual in American engines, but ground only over the journal length. The web is cut away to form a substantial counterbalance.

The main bearing comprises a phosphor bronze bush which is presumably cast in with the crankcase, reamed or bored to size and honed to finish. Running fit is excellent and at no time was there any sign of the bearing getting hot, even with the engine brand new.

The cylinder head is a die-casting incorporating a contoured combustion chamber top and carrying the glow plug offset to the transfer side. The underside of the head is recessed to sit on top of a flange on top of the liner, sealing on a gasket. Six short Phillips head screws hold the head on to the main casting and at the same time clamp the liner in place, the top of the liner locating on its flange. The glow plug is of the later American pattern incorporating a ceramic body, but otherwise has a conventional soil element.

The crankcase is a die casting, untouched, and attaching with four screws. A gasket is used to provide sealing against the (as cast) crankcase face.

Summarising, a really excellent engine throughout with a most consistent, high performance. It is also a rugged engine without paying for this feature with excess weight and, in our opinion at least, one of the finest examples in the world of modern production design and production engineering in this class. It would be our automatic choice for an engine for radio control.

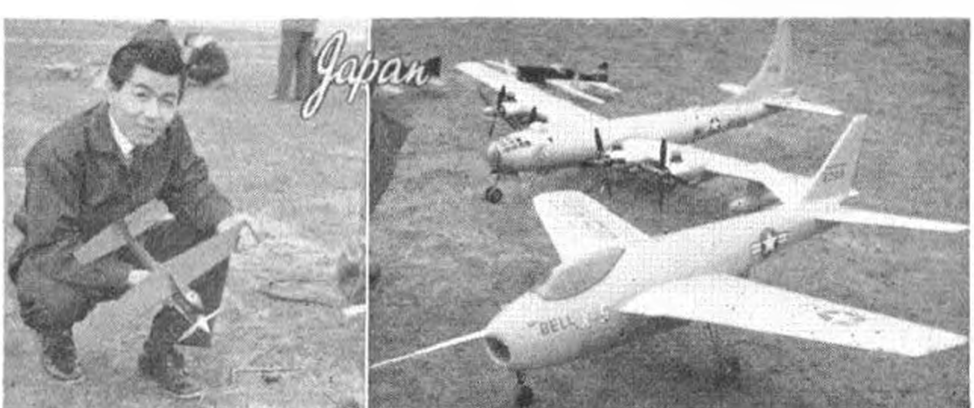
WORLD NEWS

Top shows the control-line circuit view from the Stadium at Hyeres on the Mediterranean coast of France, an ideal site for a camping holiday for aeromodellers. Below it is a special beginner trainer design by Adjutant Gilbert Allain, Secretary of the club at Hyeres. It shows a pleasant change from the plethora of low wing trainers to which we have been subjected in recent years. Gent with the A/2 is Torsten Strang, swiftly heading towards championship in the class in Finland. Model has short nose and large fin. Three-view next month

ATTEMPTS ON the World distance record for R/C models were made on January 29th by Cliff Tippett of Maitland, **Australia,** with a standard *Cicada* (see *Radio Control Models and Electronics*, December, 1960) equipped with E.D. 6-channel and Merco 35. Unfortunately it ended in a prang due to a stall which developed; but Basil Healey, who came to be an official observer, flew an identical model (popular out there, aren't they?) for a 5½ mile practice with "Silvertone" and Bonner Varicomp control.

Adjutant Gilbert Allain, serving in the French Air Force, has never lost his love for aeromodelling since wartime days when based in S. Wales with a Free French squadron. Gilbert tells us of a magnificent control-line circuit right on the Mediterranean coast of **France** at Hyeres (Var) used by the Model Air Club des Iles d'Or of which he is secretary, and which is open and free for use for all holidaymakers. Many foreign visitors fly there each year. Beside the C/L circuit, there is a hostel for accommodation and provision for many other recreations. Details can be obtained through the Syndicat d'Iniatives, Hyeres (Var), France. Our small picture at top left shows the concrete area from the stadium stand, with the sea just beyond the trees.

After placing third for three years in a row at the **Swedish** Winter Contest, Hans Thomann at last collected top place in A/2 for 1961 with 685 secs. in windy conditions. All events went to well-known names: Rolf Hagel in power with 828 secs., Lennart Tysklind in Wakefield with 804 secs., and Gamen won the team prize. Gunnar Kalen of Gamen had a field day with a third in Wakefield and fourth in A/2 to help his team at Katrineholm. Another big Swedish meeting took place up country at Norberg with 80 entries, B. Blomberg of Gamen collecting Wake with 847 secs., M. Whitey the A/2 class with 856, and Lennart Larsson top in power with 724. The last two come from Solna and their wins helped that club win the team prize. The Nordic Countries Annual Champs will be held at Ljungbyhed, the southernmost point of Sweden, on June 3rd/4th, and the team from **Finland** will be selected after their third Champs meeting over Whitsun. Wintry conditions with a cold north wind spoiled their second Champs at Tampere on March 19th, the competitors having to travel two miles out on the ice to get clear of the downwind shore. Models were cartwheeling on landing and more than half the A/2 men broke their wings in the first round. A three-minute max took the model to the shore and with four inches of snow over the ice, a max meant an hour's recovery run. In minus 8 degrees Centigrade



The O.S. Engine Co. celebrated their 25 years of model engine manufacture with a contest at Nishinomiya baseball field, attended by Japanese modelling pioneers with O.S. chief S. Ogawa and engine designer Hiroshi Sawada in attendance. Far left shows speed winner Mizobata with O.S. Max 15 I Racing Glow model and to right are O.S. experimental B-50 and Bell X-5 scale models with O.S. team racers in background

Torsten Strang of Vaasa, who had won A/2 in the first Champs, showed his prowess to make a great 870 secs. over Seppo Takko's 823. In power, this contest for real trojans went to Osmo Niemi's *Pulteri*, proxy-flown by brother Ossi to 877 secs., a lead of only five secs. over Sandy Pimenoff with *Number* 18. Though he missed his first flight through an over-run, Harri Raulio still came into third, so in fact it is the well-established names still well up in Finnish power modelling. Wakefielders were hampered by the cold, but even so, Reino Hyvarinen made 871 secs. with *Jeppe* for his fourth successive victory at Tampere, Bjorn Storgards was second at 857 secs., followed by Seppo Pohjolar with 806.

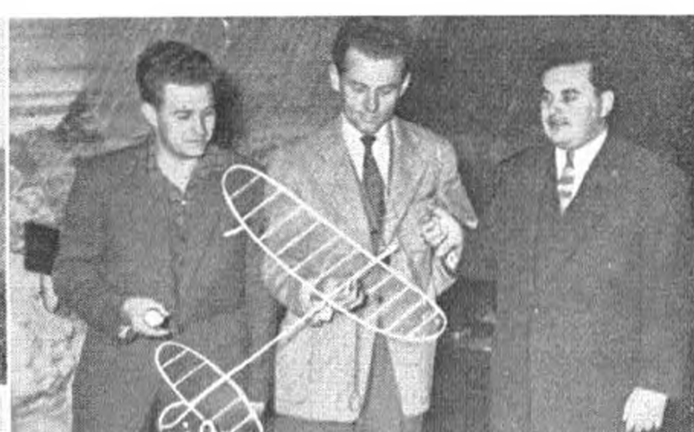
As we have mentioned before in previous years, there's a moral to be learned in this intensive Finnish programme and it will probably reap the benefit in September this year.

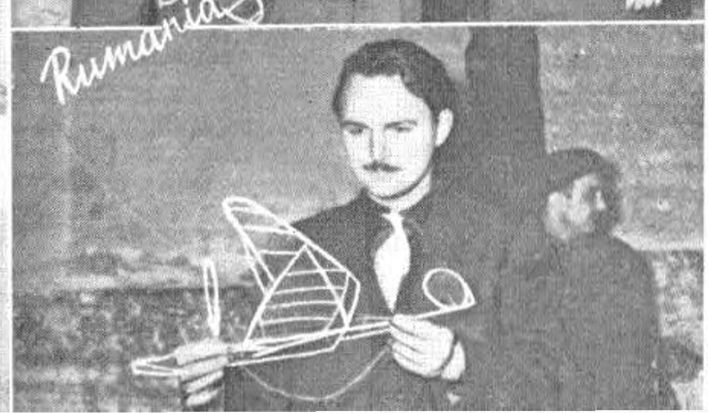
Another country which is taking World Championships seriously is **Rumania,** where the indoor champs were held at the Ocna Dej salt mines on March 18th/19th with no less than 43 competitors. With a 150-ft. ceiling, times were expected to be high, though conditions in the mine actually kept durations down and only the 19:11 record flight by Otto Hints in the under 35 cm. class was exceptional. For a 14-inch job we would substantiate such a claim as being the best yet. Top contest times were 16:54 in this class by Peter Siegel and in the over 35 cm. class, 13:26 by Andrei Budai, while the tailless leader was George Marinescu with 11:07.

There seems to be some doubt on the eligibility of steel towlines for A/2 work, but in fact they are completely within all regulations, and may well be essential to cope with the new tensile test. Of the many bulletins we receive, the South Californian Aero Team "*Scatter*" from the **U.S.A.** is clearest on this point, and has produced a fine summary of tests by John Wordin, on which we hope to obtain permission for publication next month. The significant point in his findings is that over seven launchings the average line pull was 4·95 lb. — but don't forget the tests were made in California!

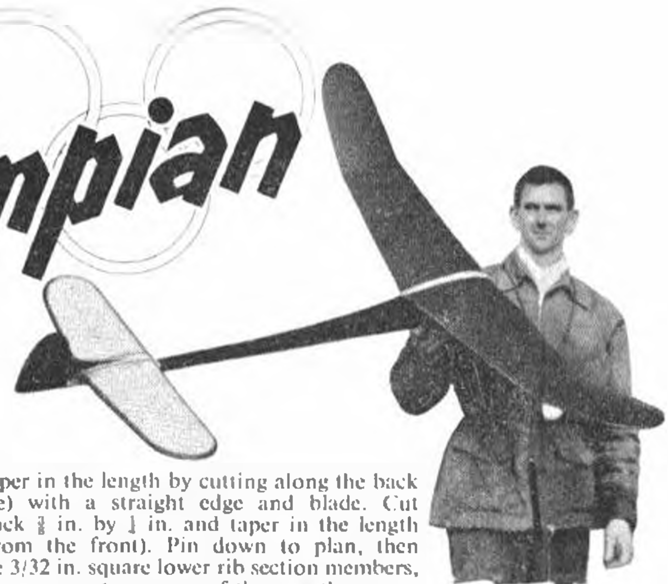
Above, Australian modellers Harold Flanagan and Mechanic Leo Toft with the fastest class B racer at their Nats, using an Enya 29. Refreshing sight of a well-made solid scale model comes from Swedish modeller Thorulf Stading of Aspen, and is his reply to the plastics in the shape of a SAAB S-17 of 1941 vintage. Would make a nice subject for scale C/L

Below from U.S.A. real evidence that you can fly 600 square inches on an .049 ! ! from Chicago. The Indonesian aeromodellers are from Parusan, out on a typical day of sport flying with their gliders and small rubber jobs. Just goes to show it's the same the whole world over! Rumanian modellers down in the salt mine are Otto Hints after 19:11 flight, with his timers, and George Marinescu with 11:07 tailless job





Olympian



Designer Laurie Barr and his 14-oz. original, NOT F.A.I. as we suggested last month!

Laurie Barr's fabulous new construction system for Lightweight open power models is quick, easy and super rigid

THIS MODEL was developed to make full use of the high power to weight ratio of the Cox Olympic engine although in fact it suits any 2·5 - 3·5 c.c. engine. with the advantage of accepting rear fuselage sheeting for the heavier diesels.

The flat bottom wing section, and the constructional features will be controversial to some, however you will find that the wing and tailplane can be made very easily and quickly, provided you set about it in a workmanlike manner. As to the qualities of flat bottomed wing sectioned models, they do give a very fast and more important, a viceless climb, and with the light wing loading on this model, the glide is excellent. Those of us who were privileged to witness Larry Conover's model *Lucky Lindy* out climb and glide every other model at Cranfield in the World Champs in 1960, would agree that flat bottom wing sections work.

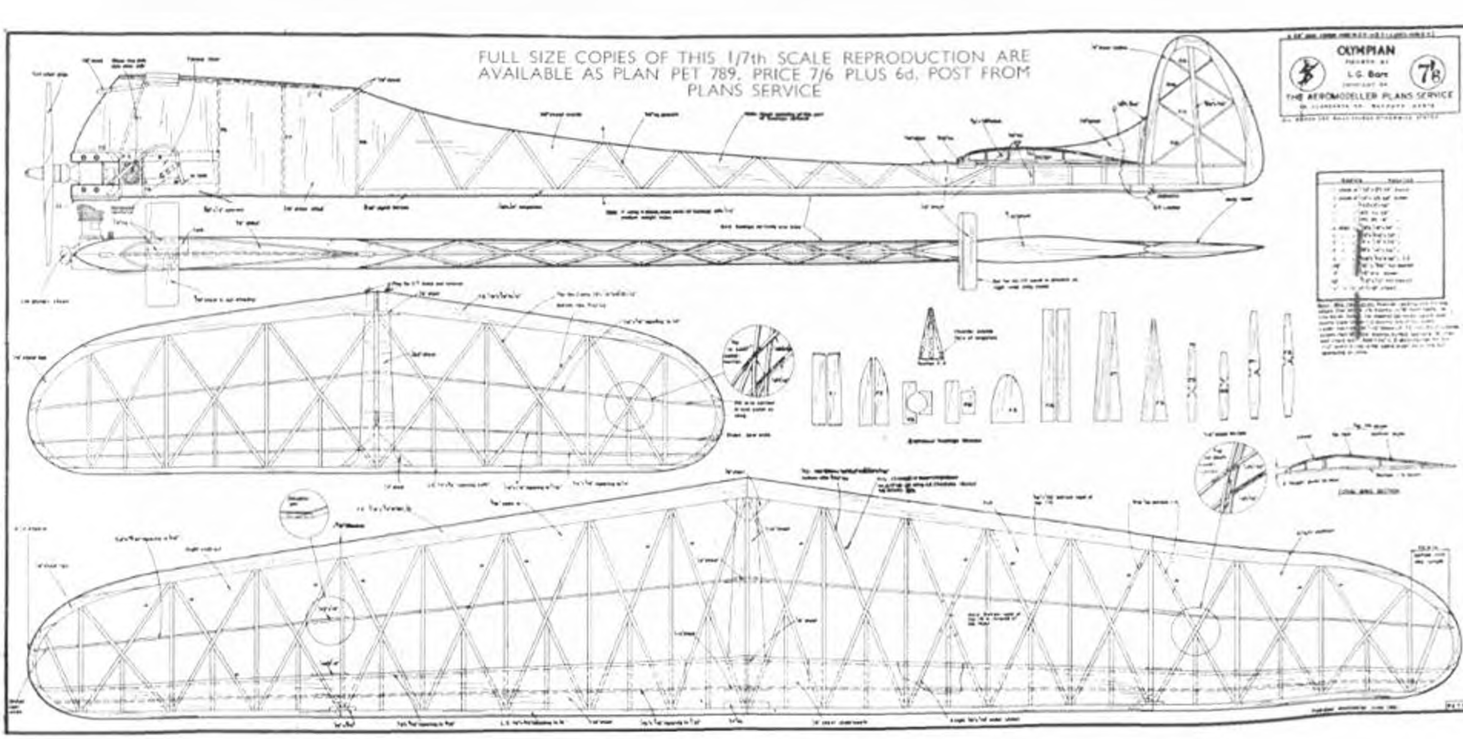
Construction

Most of the followng concerns the building of the wing and tailplane. As we have said previously it is by no means as difficult a task as it would appear. It is of paramount importance that you should make a thorough appreciation of the methods and reasons for building the flying surfaces in the manner described. Of equal importance is the fact that careful note should be taken of the wing warps (see drawing) as these *must* be built in, as this structure is so rigid and warp proof, that no twist can be put in afterwards, and you will have to acquire a couple of building boards, that twist in opposite directions to each other.

The idea of making up a wing with the sections cut out of sheet with a template, or bent over spars to form a section is not new. The same basic principles in this case apply except that the upper curved part of the section is made up in a two layer lamination geodetically, which at the same time allows perfect halving joints to be made, with at least one of the layers running through from L.E. to T.E. without a break.

Inner left hand panel, should be built flat. Take a stock piece of ⅜ in. by 3/16 in. T.E. section med. hard. Cut to length between the dihedral joints (at half the angle), and taper in the length by cutting along the back (thickest edge) with a straight edge and blade. Cut L.E. from stock ⅜ in. by ¼ in. and taper in the length (as viewed from the front). Pin down to plan, then cut and fix the 3/32 in. square lower rib section members, noting that there are not as many of these as the upper laminated part. Cut from the appropriate thickness of hard sheet, the spar members as detailed on the plan, noting that these are also tapered in the length. It is vital that this work is done carefully, as it is these spars that govern the finished shape of the wing section, since the upper laminations are formed over them.

Note also that the spars are not cut to exact length between dihedral joints at this stage (unlike the L.E. and T.E.), allow them to be approximately 1½ in. longer to make the joining at a later stage of the tips, easier and stronger. When the L.E., T.E., lower rib parts and spars are set, the upper chordwise rib booms are bent and laminated over. Cut ⅛ in. wide strips from 1/16 in. quarter grained sheet, and lay them out, down the wing panel in a "W" formation; making sure that each piece is fitted in one unbroken length between L.E. and T.E. When these are set "the opposite hand" of the "W" can be laid down so as to convert the "W" into an "X" formation, these "X" parts being butt joined at each intersection of the "W" parts layed prior. The short support pieces of ⅛ in. by 1/16 in. can be laid in from approximately mid chord, to the leading edge.



All of these lower laminations must be set in 1/32 in. *below* the top edge of L.E. and T.E., to leave room for the top laminate which is 1/32 in. thick. When this is set, lightly sand with fine paper on a block, to remove any surplus cement etc. The upper laminates can now be fitted, which are made up of a 1/32 in. sheet leading edging, and ⅛ in. by 1/32 in. strips. Cut the leading edge from 1/32 in. sheet, and cement in place, you will find that if you slant the cutting blade to produce an undercut of the back edge, that this will make the butting and holding in place of the last layer of the laminate eaiser. When the leading edge sheeting set, finish off by adding the ⅛ in. by 1/32 in. strips to the upper rib section, noting that these are laid up in a "W" formation (like the lower laminate) but in the opposite direction, so that a halving joint is formed, instead of a double layer of butt joint. The use of P.V.A. cement and paper clips, make all laminating very easy.

Apart from carving the leading edge and sanding the whole panel lightly, this completes one typical wing pale. All the other wing and tailplane parts are done in like manner,

To join the inner section (which should be built on a board having a twist sufficient to produce the wash in on the inner right hand panel) pin down over the plan at the dihedral joint, and prop up the other end with a book or any other handy item, to the appropriate height for the dihedral, and build the next panel right on to it. The overlength spars on the propped up panel can be spliced through on to the next panel to be built. The tips are also built in the manner described, and are propped up and built right on also, noting that these tips are both washed out, and should be built on boards, twisted in opposite directions or on a jig with supports.

Commence fuselage by cutting the engine bearers to length, drilling these to suit your engine, and bolting onto the engine. Whilst bolted on, cut a piece of 1 m/m ply or hard 1/16 in. sheet, the overall width of the bearers, and as long as from former F6 to F4. Glue onto the bearers on the outside facing edge and allow to set. When dry the engine can be removed, as this method allows a perfect fit later. Cut from med. hard 3/32 in. sheet, the plan outline of the lower keel, and pin down securely to the (flat!!) building board. Cut out, and cement into place the side elevation fuselage outline from ⅛ in. med. sheet. Cut out and cement into place all fuselage formers F1 to F8, cut out, notch into the crutch, the wing platform and wing platform brace. Add the ⅛ in. by ⅛ in. keel stiffeners either side of the fuselage lower platform. Cut out and cement the tailplane mount, which includes the fin platform, and is shaped rather like a stretched "hour glass". When all these parts are set, cut and fit the warren girder bracing from ⅛ in. square med. hard, add the sheeting under the front tail mount bay, fit tank for plain feed or pressure, or if pen bladder is to be used, make a small open sided box, flush with the right hand side of the fuselage, and all the sheeting (with the grain running vertically) around the engine bay and wing mount, noting that the sheeting around the engine and intake bay, will have to be well fuel proofed before fitting, as you cannot get at this after sheeting is completed. Cut, notch and cement the tailplane mounts at the tilt angle, add the wing dowels, make provision for the timer, fit and remove to give free access to the finishing, around this area. Make up fin outline from 3/16 in. sheet, cement some 1/16 in. sheet oblongs for fin ribs, in an "X" formation, add centre stiffener and when dry, the fin airfoil can be sanded to a bi-convex shape. Cement fin on top of tail platform, notching in the fin centre stiffeners into the lower fuselage keel. Remove the fuselage from the board, add the front engine bay keel reinforcement from 1/16 in. ply, and sand lightly the entire fuselage. If using a diesel, sheet all fuselage with 1/16 in. medium weight balsa, this adds strength and aids balance.

If you are in the semi-expert class, cover the whole model in lightweight model span or Jap tissue, if not use heavyweight Modelspan. Apply at least three coats of good quality clear dope to all parts. When dry finish off with good coverage of fuel proofer, being particularly generous around the engine bay.

General

Allow ample time for the fuel proofer to harden off, and fit engine. Test with trial engine run before you get to the flying field, and adjust if necessary.

Assemble the model, and when viewed from the back, the right hand inner wing panel should have approximately 3/16 in. wash in. with both wing tips washed out also 3/16 in. The tailplane which must be flat with no warps at all, should have glide tilt (right side tilted up as viewed from the rear) to equal the dihedral angle of the inner right hand wing panel. (This may be adjusted to suit glide turn requirements later).

This model has been tried with various types of pressure systems, from plain tanks, pen bladders, and is at present being operated with a sealed tank circuit, pressurized from a crankcase tapping, the important thing to remember with any form of pressure feed is to have a timer that shuts off the fuel supply completely, as anything less than this might allow the engine to run on. For this purpose I can thoroughly recommend the "Tatone" timers. The finished weight complete with engine timer prop etc., should be about 14 ozs.

Flying

This model is extremely easy to handle, and will take any amount of abuse in respect of too much glide or power turn, this makes it ideal for learning how to trim out a hot power model.

Test model for glide which should be fairly fast, but flat, up to 3/32 in. of packing can be allowed under either the L.E. or T.E. of the tailplane, (in small stakes 1/32 at a time), to produce this glide, if further adjustment is required then ballast the appropriate end of the fuselage with plasticine. When glide is O.K. set timer for 5-7 seconds engine run, and use about ½ to ¾ power for first few flights. Flight pattern should be an upward rolling spiral getting steeper towards the end, with no tendency to turn too tightly to the right, or to open out into a left turn which can be fatal on higher power. This model must be flown right/right.

Watch glide carefully, which should be in moderate circles, and on successive flights, (providing at this stage the power on trim seems fairly safe) concentrate on getting the glide just right, using more or less tail tilt as required for glide turn, or more or less ballast accordingly.

Having satisfied the glide requirements, start using longer motor runs, with more power, until you achieve a power-on pattern with the model making about 3-4 spirals in 15 second engine run. To adjust for power turn, either side thrust and/or rudder trim may be used, my own preference is for side thrust.

If a plain tank or pen bladder is used, I would recommend the use of an 8 in. by 4 in. frog nylon prop. For pressure feed use 7 in. by 4 in. for maximum output, but get you fingers out of the way a bit smartish while starting!!

For contest work, use a glow fuel with a high nitro content, such as Super Nitrex, but if you do, disconnect the battery lead as soon as started or you may find it a bit expensive on plugs!

FUELS for diesels

It is intended in this article to put forward a scientific approach towards the formulation of workable fuel mixtures suitable for combustion in model diesel engines. This article first appeared in Mexboro' M.A.C. Magazine, to which due acknowledgment is made.

by S. J. Lobley

THE MATERIALS.—Let us first consider the materials which are commonly available.

OILS.—For general use, mineral-based motor oils can be strongly recommended, and in fact no better oil suitable for our purpose can be found to give better quality for money. The oils most suitable are those having S.A.E. ratings between 40 and 60, which are readily available in many different brands. In winter, an oil at the "thinner end" of this range is to be preferred to the thicker oils which have the higher S.A.E. rating numbers. However, this point need never cause any worry since this adjustment is seldom critical except in extreme climatic conditions which are not generally experienced in this country; nevertheless, let it be mentioned that the application of a little common sense here and there will avoid trouble: for example, the use of a summer oil in mid-winter is not a sensible arrangement. Of all the oils available on the market, I personally wouldn't hesitate to recommend the *Wakefield* range, and in this connection would add that I have found no mineral oil better suited for use as a universal oil for fuel preparation than *Castrol "Grand Prix"* which, having an S.A.E. rating of 50, falls midway between the limits already prescribed, and consequently is equally suitable for summer or winter use. Also a further point in favour of this oil is the fact that it is specifically produced to maintain adequate lubrication at higher shaft revolutions than ordinary motor oils and in this respect is obviously more suited to coping with the lubrication problems of our fast revving engines than are most other oils. In passing mineral motor-oils, it may be mentioned that whilst the author has had experience of other people's using the various multi-grade oils such as *Shell* X-100 and *B.P. "Energol"*, which are now available on the market, without any evident depreciation of performance or mechanical soundness of their engine, he cannot say whether or not these oils are to be recommended for use in diesel fuels, because they depend for their action upon viscosity stabilisers which retard the rapid falling-off of the viscosity of the oil at high temperatures (this phenomenon being responsible for rapid engine wear). Now, the solution of those oils in Ether, for chemical reasons, is likely to produce structural changes involving the molecular form of the oil, which, being so affected, may not then be subject to the stabilising influence of the additive. In addition to the use of mineral oils, vegetable base oils may also be used with advantage: castor base blends possessing lubricating properties inferior only to graphite and molybdenum disulphide preparations. On grounds of superior lubrication alone, ordinary Castor Oil B.P. cannot be bettered amongst castor base oils; unfortunately, however, this superior oil may cost up to twice the price of the alternative mineral oil. Even so, its use for high performance engines is to be strongly advised and also the owner of a baby diesel would find that treating his engine to this aristocrat of lubricators would amount to negligible extra cost. However, for engines of over 1·5 c.c. capacity its use is associated with an appreciable increase in fuel costs, and so except for competition purposes, it is more desirable in these circumstances to use a good mineral oil instead. Commercial Castor Oil, and Pratt's Racing Castor Oil may be used in place of ordinary pharmaceutical quality castor oil, and a reasonable reduction in fuel costs will result. As lubricators, they are only slightly inferior to Castor Oil B.P. and as such are to be preferred to any mineral oil.

ETHER.—The ether employed in diesel fuels is ordinary common "Ether", and on no account should it be confused with various other ethers which are entirely different chemical compounds and are quite unsuitable for our purpose. As an aid towards distinction of common "Ether" from any other ether which might be met up with, it is sufficient to say that if a small amount of "Ether" (just enough to wet) is poured on to a plate or other resilient surface, it will evaporate away completely within a few seconds, or a minute at the most; whereas another ether so treated will not readily evaporate. Common "Ether" may go under one of many different names according to its grade and intended use; any of the following names may be applied to common "Ether" — Anesthetic Ether; Commercial Ether; Methylated Ether; Di-Ethyl Ether, Ether Meth.; and Ether Solvent. Any of those forms being satisfactory for use in diesel fuels. Anesthetic Ether is the purest form of ether normally available and because of the exhaustive purification processes which it has undergone, it will be the most expensive of all the forms. Commercial Ether and Ether Solvent are considerably cheaper than Anesthetic Ether and at about four shillings per pint each, obtainable from Boots Chemists, they represent about the cheapest reliable ether that can usually be obtained. Of the two, Ether Solvent is to be preferred because it is purer than Commercial Ether, but really this is of little importance since these impurities are only slight and are neither corrosive nor incombustible. If, however, Solvent Ether is asked for, enquiry must be made that it is of a chemical form called "Di-Ethyl Ether" of boiling point 35 deg. C., because there are other entirely different varieties of ether which can also be called Solvent Ethers.

PARAFFIN.—Little need be said about paraffin except that a reliable commercial brand should be purchased. In spite of popular belief, the colour of paraffin bears no relation to its efficiency as a burning oil. The following brands may be recommended: Aladdin Pink; Fina Green; Esso Blue; Shell Royal Daylight. The calorific values (or heat content) of different products vary slightly; that of the highest calorific value contains most energy and being most suited to our purpose. However, in the absence of data on this point, it is not possible to advise the reader.

THE MIXTURE.—The simplest working mixture consists of equal parts by volume of oil, paraffin and ether. However, in order to make the most of the materials available and of the capabilities of our engine, and of our money, we must make prudent adjustment of the proportions of the mixture. Now, anyone who has run his engine on a fuel of the above-mentioned type which contains 33⅓ per cent. of oil, will appreciate that the use of this amount of oil is grossly out of proportion;

in fact, the copious amounts of unburned oil which are ejected are an indication that the engine has not only sufficient oil for lubrication purposes, but that it has also more excess oil than it can get rid of by burning. It is not, at the best of times, a desirable situation for any engine to burn its lubrication oil since this leads to rapid carbonising and loss of overall power and efficiency because of the poorer burning qualities of oil as compared with those of paraffin. It is clearly evident that an engine which ejects unburned oil must also be burning its maximum quota of oil, and, all other things being equal, it is consequently working at its lowest possible efficiency. In addition to this aspect of the problem there must be considered the absorption of power due to the pumping of the inactive non-gaseous unburned oil through the engine. Hence, it is necessary (*a*) to eliminate the excess of oil which is ejected unburned from the engine and (*b*) to minimise the amount of oil burned within the engine, leaving only sufficient for lubrication purposes. In this latter respect, however, it is impossible, due to lack of precise scientific data, to ascertain the exact amount of oil required for lubrication alone; and so, in order to err on the safe side, a small excess of oil must be included in the fuel. After much careful consideration based upon experience and experiment over several seasons, the author has come to the conclusion that on no occasion, except when running-in a new or lately dismantled engine, is an oil content of over 25 per cent. by volume ever called for, even with the most demanding engine. With regard to fully run-in engines, 20 - 22 per cent. of oil may be used with plain bearing engines, the amount varying slightly to suit individual engines and individual occasions. For ball bearing or roller bearer engines, 18 - 20 per cent. of oil need only be used. If the oil is of the castor base type, which, as already explained, possesses superior lubricating properties, then the oil content of a fuel may be reduced by a further 1 per cent., and by as much as 2 per cent. in the case of pure pharmaceutical castor oil, and still observe a generous safety margin. In arriving at these considerably reduced figures, the author has no misgivings, since even as they stand, these figures represent quite a considerable oil excess. Indeed mineral oil contents can be reduced to as low as 15 per cent. if accompanied by 1 or 2 per cent. of an oil soluble preparation of graphite or molybdenum disulphide. It is not recommended that castor base oils be treated with these additives unless they are specifically designed to be so used. Furthermore, tests on Allen-Mercury engines have indicated that the use of as little as 7 per cent. of oil, on runs of moderate duration, has proved entirely satisfactory, and, as far as could be ascertained, did not give rise to greater engine wear than is normally to be experienced, when using a fuel of greater oil content. In view of this, it would most probably be found that an oil content of 10 per cent. would be adequate to cover the most extreme circumstances. However, in the absence of unequivocal confirmation, the oil contents of fuels are best left as already recommended: that is, in the region of 20 per cent.

"Of course I'll get this lot perfected, then someone will invent compression-ignition"

After considerable use, an engine requiring a re-bore, should have the oil content of its fuel raised slightly in order (*a*) to increase the compression seal with an eye to maintaining the pumping efficiency which is of particular importance for easy starting characteristics; and (*b*) to prevent excessive wear due to the very loose piston cylinder fit. Nevertheless, more than 25 per cent. oil content need never be used.

Now let us consider the adjustment of the ether content of the mixture. Theoretically the more ether that is present in a mixture the better; however, in practice the ether content must be limited to a reasonable figure, otherwise the paraffin content will be reduced to impracticable proportions. A convenient maximum limit may be set at 45 per cent. of ether. *Note:* The use here of the term maximum is not intended to imply an upper limit which if exceeded may be detrimental to the engine; indeed not, it is intended only that the ether content of the mixture should not be allowed to become so great as to drive the paraffin content (which, after all, is the power-yielding constituent) into insignificance. Although it must at least be admitted that the liberal use of ether in excess of 55 per cent. in a mixture is most decidedly dangerous. However, to get back to the point: the upper limit of 45 per cent. which we have set ourselves, is a most desirable limit to work to, since high ether content makes for cooler running and smooths the combustion to a degree which cannot be obtained by use of dope additives alone on fuels of lesser ether content. Both these factors are of prime importance in the combustion of the fuel, and unfortunately this essential treatment of fuel formulation to obtain this desirable situation is often overlooked by the modeller who boasts masses of chemical names intended to convey knowledge of special "dynamite" additives which are claimed to lease considerable extra power, and promote hitherto unknown smoothness of running ! ! ! Whilst I do not intend to discourage the use of such additives (indeed, few fuels are properly formulated without judicious use of appropriate additives) I must nevertheless make it clear that their use can only be taken full advantage of if they are used in sensible amounts in the right place and for the right purpose. There appears to be much controversial argument associated with arriving at a suitable figure for the ether content of fuels: and clearly there exists here a topic open to considerable discussion. Bearing this in mind, the author offers his own views on the subject in an attempt to make clear his reasons for adopting them.

As has already been explained, a maximum ether content of 45 per cent. is adopted (*a*) to induce cooler running; and (*b*) to promote smoother, more complete combustion.

The necessity for cool running is on account of the increased volumetric efficiency which is to be had as a result. All that this means is that a charge of atomised fuel entering the cylinder at a high temperature expands a certain fixed amount after ignition and gives rise to a corresponding fixed amount of power available partly as shaft power. Now, if the overall temperature of the cylinder is kept lower as a result of using a high ether content fuel, then the temperature change of the charge (which on originally entering the cylinder is near the

FUELS for diesels *(continued)*

temperature of the cylinder and finally is at the same high temperature of combustion as in the first case alluded to) is greater during the compression / power strokes than in the first case and so gives rise to greater potential expansion of the exhaust gases, which, being in the same volume as those in the first-mentioned case, gives rise to greater internal driving force which emerges in the form of increased shaft power. May I refer those reluctant to believe this, to the falling off of power and revs apparent during the first few seconds of an engine run whilst the temperature of the cylinder is rapidly rising. It is a portion of this "lost power" which is reclaimed (by the use of high ether fuels) by preventing the temperature of the cylinder rising as high as it would if a low ether fuel were used. As a consequence, therefore, of observing this point, the benefits of slightly increased power availability and cooler cylinder temperatures are to be had.

As to the second advantage to be gained by the use of high ether content fuels (*i.e.*, smooth and more complete combustion), it may be argued as follows:

A constant volume of paraffin / ether vapour such as the atomised fuel charge transferred at each revolution into the cylinder, will, under the constant conditions prevailing in an engine running at constant speed, burn at a constant rate when ignited, *i.e.*, one charge will take the same time from ignition to completion of combustion as will the next charge and the next, and so on. Now the speed at which the charge burns after ignition is directly dependent upon the proportion of ether present in it; that is to say, a charge containing a smaller proportion of ether to paraffin will burn more slowly than a charge which contains a higher proportion of ether. In fact, where the proportion of ether to paraffin is small, the ether which ignites first, might conceivably be completely expended before much of the paraffin has burned. This reluctance of the paraffin to burn quickly means that unburned paraffin vapour leaves the exhaust when the charge is displaced by the income of a fresh charge via the crankcase. Thus, part of the calorific value of the fuel is lost, and escapes unharnessed. If engines were designed to run at lower revolutions, there would probably be sufficient time during the power stroke to allow for complete combustion, but since we demand ever increasing revs of our engines, we must make adequate provision for the slow burning of the paraffin to be accelerated in order that complete combustion shall occur before the charge is rapidly displaced by a fresh charge from the crankcase. This is admirably done using a fuel of high ether content. It must not be thought that ether is employed in diesel fuels solely for ignition purposes (if this were so, then only a small amount would be required); it is also essential to accelerate the smooth uniform combustion of the paraffin vapour; this fact becoming more and more important the more we expect engines to run at ever increasing speeds. It is here that we may explain a previous allusion to the wrong use of additives. The use of amyl nitrate has long been advocated as a cure for late ignition and uneven and incomplete combustion of the charge, but with the subtle proviso that we can hardly expect to "doctor" or "paint over" the basic formulation defects of a fuel by liberal use of this additive.

Use of Amyl Nitrate

It may indeed be conceded that many imperfections may be obscured by use of amyl nitrate or similarly acting additives, but in such cases little or no extra power will be in evidence, because all the additive will be employed in smoothing uneven running, rather than in providing higher revs in consequence of which more power is made available. On the other hand, addition of amyl nitrate to a carefully formulated high ether content fuel will provide a much more apparent effect, producing a smooth increase in power and considerably increased flexibility and ease of adjustment of the engine and what is more important, only a small amount of amyl nitrate need be added; never more than 3 per cent. for general purpose fuels, 2 per cent. proving entirely satisfactory in the majority of cases. To summarise this point, the use of a high ether content fuel will promote smooth complete combustion and so pave the way for the addition of judicious amounts of amyl nitrate to yield extra flexibility and appreciable power increase whereas the use of a low ether content fuel will necessitate the addition of far more amyl nitrate before a performance in any way comparable to that in the latter case, will be realised, and also will give rise to two additional undesirable situations. These are (*a*) high cost — bearing in mind that addition of amyl nitrate to the extent of only 2 per cent. to one pint of fuel costs about 1/1d, it is readily evident, therefore, that at least two shillings must be spent on amyl nitrate added to one pint of a poorly formulated fuel before it becomes anywhere nearly comparable to a high ether content fuel which contains only a little amyl nitrate; (*b*) heating troubles — of all the fuel constituents in current use, amyl nitrate and similar additives are the worst offenders as regards producing overheating problems. Thus the low ether content fuel which requires most amyl nitrate to "doctor" its basic defects will suffer from a tendency to cause much overheating of the engine which is highly undesirable for reasons already explained as well as for mechanical reasons. On the other hand, the high ether content fuel which naturally causes cooler running will be more than able to cope with any heating tendencies induced by the small amount of amyl nitrate which may be added. To be more specific about ether content, it is strongly recommended that up to 45 per cent. of ether can be used wherever possible and it is guaranteed that its use in this proportion will give benefits in all the

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For your Diary

May 14th. Cambridge Slope Soaring Rally—F/F, Multi and Single R/C. *Ivinghoe Beacon, Chiltern Hills.*
May 28th. East Lancs M.A.C. Open Contest—Open Power, Rubber, Glider. *Walton Spire, Nelson.*
June 4th Wharfedale, C/L Rally—½A, "A" and "B", T/R, Stunt and Combat. R.A.F. *Rufforth.*
June 10/11th. P.A.A. Scottish Festival. All P.A.A. classes, open F/F, Combat, A.B T/R. R/C. Enter to *24 Moor Rd., Ayr* by 27th. May.
June 11th. Midland Gala, Open—F/F, Chuck Glider, ½A Power, ½A, A, B, T/R, Stunt, Concours R/C. R.A.F. *Wellesbourne.*
June 18th. Junior Leaders Regiment R.E. C/L Rally—Combat, Stunt, Speed. *Old Park Barracks, Dover.*
June 18th. Scottish C/L Nats. *Beveridge Park, Kirkcaldy.*
July 2nd. Northern Heights Gala—All F/F classes, R/C Spot landing, Combat, Concours d'Elegance. R.A.F. *Halton.*
July 9th. West of Scotland F/F Gala—R.A.F. *Abbotsinch.*
July 23rd. Ashford C/L Rally—Combat, F.A.I. T/R. *Victoria Park, Ashford, Kent.*
August 13th. St. Albans F/F Gala—U/R Rubber, Power, Glider, ½A Power, S/C Radio spot landing, Slope Soaring. *Chobham.*
August 13th. Rush Trophy Gala—½A, U/R Power, U/R Glider, U/R Rubber, Combat. *Newcastle.*
August 20th. Scottish Gala and U.K. Challenge Match—*Abbotsinch.* (New Date.)
August 20th. C. H. Roberts Cup—Flying Boats. *Dartford Heath.*
August 20th. Devon Rally—Open F/F, ½A Power, Combat. *Woodbury Common.*
August 27th. South Midland Area Gala—All Classes. *Cranfield.*
August 27th. I.R.C.M.S. Annual Aircraft R/C R.A.F. *Wellesbourne.*
September 10th. Northern Gala (new date).
September 17th. Croydon Gala—Open Rubber, Glider, Power, ½A Power, Slope Soaring. *Chobham Common.*
September 29th. Caledonia Shield—*Lanark.*

respects mentioned. However, the formulation of fuels for such special purposes as team racing demand an adjustment of the formula. In the case cited there is call for maximum duration which necessitates a slight increase in paraffin content of the fuel and so it is necessary to reduce the ether content slightly in order to balance the mixture. These adjustments are only of the order of a few per cent. and in no circumstances should the ether content be reduced below 40 per cent. because the engine of a team race aircraft is called upon to give high performances which in the absence of a high ether content in the fuel, would cause overheating difficulties. The ether content may also be reduced below 45 per cent. quite justifiably on the grounds of economy and so 40 per cent. of ether will be satisfactory for most general purpose flying fuels, although the performance obtained will be slightly inferior to that obtained using a fuel of 45 per cent. ether content. As the ether content of fuels is reduced further from 40 to 35 per cent. a more noticeable depreciation in running qualities is observed by its use and it is doubtful if any of the advantages discussed in this article are to be had from a fuel of only 35 per cent. ether content. It is recommended, therefore, that the use of only 35 per cent. of ether in a fuel be avoided except in economy "brews", and even so in hot weather, 35 per cent. of ether is too low for even the most economic fuel that should be attempted. The author cannot commend the use of less than 35 per cent. of ether in any fuel whatsoever on grounds of overheating and possible tendency towards seizure in hot weather. Also, in passing it may be mentioned that low ether content will produce rough running and misfiring, due to difficulty experienced in getting the mixture to fire satisfactorily in addition to the obvious difficulty in starting.

The paraffin content of a fuel is determined merely as a balance, once the oil and ether percentages have been agreed upon. Let it not be thought that this is an abandoning attitude towards the fixing of the proportion of paraffin to be incorporated in a fuel. Although in the first place, paraffin is the only constituent of the fuel which is intended to burn solely as a power producing agent, it cannot perform this function efficiently unless the lubrication and combustion problems have been adequately solved first. Therefore, it must play a subordinate role in the diesel fuel and in fact constitute far less than half the volume of the total mixture. The use of Iranian gas oil is not to be recommended as a substitute for paraffin, as often is the case; because due to its higher molecular weight, it is less easily vaporised than paraffin and gives rise to incomplete and uneven combustion, which, as already explained, we are most anxious to avoid. Thus the additional lubricating properties which this burning oil possesses over and above the almost non-existent lubricating properties of paraffin do not balance the other disadvantages associated with its use, and in any case, there are divers excellent lubricants already mentioned which can be used to better effect.

Just a word on the use of additives. The use of amyl nitrate which is the only important additive in general use for diesel fuels, has by and large been adequately dealt with in the treatise referring to the use of ether.

The author considers its use in small amounts to be essential for use in any fuel intended for a modern diesel engine whether large or small. This is not necessarily the case with older engines which are intended for running at lower revs. Where the use of amyl nitrate is found desirable, amounts much less than 1 per cent. appear to have little effect. The use of 4 per cent. of amyl nitrate instead of 3 per cent. in a "hot" fuel is not justified by the slender increase in power yielded by the addition of this last percentage, as compared with the noticeable improvement evident when the additive content is raised from 2 to 3 per cent. Therefore, except for competition purposes, the use of 4 per cent. of amyl nitrate in a fuel for use in moderately long runs cannot be justified because of additional penalties incurred as a result of a tendency towards overheating. Diesels of over 2·5 c.c. capacity generally are prone to rougher running tendencies than their smaller counterparts and it is usually found that a slightly higher amount of amyl nitrate has to be used to combat this; allowances for this phenomenon being made with regard to formulae to be found overleaf. If difficulty is experienced in obtaining amyl nitrate, then amyl *nitrite* may replace it in all fuel mixtures to give comparable effects, except that about twice as much nitrite as nitrate is required. With this in mind, it will be found that its use to similar effect is slightly more expensive than the use of the nitrate, and in addition it provides an extra inactive bulk in the fuel, once its oxygen has been released.

The author, being at this time without experience of the use in fuels as an economy agent of nitrobenzene cannot recommend its use except in as much as to say that it has been reported from some circles to be satisfactory in this respect. How its presence in fuels affects the heat problem, cannot readily be assessed without experiment and it is to this end that experiments of just such a nature are to be carried out in the future.

As a final word, let it be said that no amount of effort in careful decision over fuel formula can be of use if the constituents of the fuel are not clean and free from foreign bodies.

Fuel formulae

2·5 c.c. Team Race B.B. Engine

18% Castor Oil B.P.
42% Ether
40% Paraffin
+ 2-3% Amyl Nitrate.

2·5 c.c. Duration

B.B. Engine	P.B. Engine
17% Castor Oil B.P.	19% Castor Oil B.P.
45% Ether	45% Ether
38% Paraffin	36% Paraffin
+ 3-4% Amyl Nitrate	+ 3% Amyl Nitrate

General Purpose Flying with high performance 2·5—3·5 cc.. B.B. Engines

e.g. Oliver "Tiger", P.A.W. Special, ETA 15, Rivers "Silver Streak" Frog 249 B.B. (Modified); Rivers "Silver Arrow".

18% Castrol R.	20% Castrol "Grand Prix"	20% Castrol "Grand Prix"
45% Ether	40% Ether	35% Ether
37% Paraffin	40% Paraffin	45% Paraffin
+ 2-2½% Amyl Nitrate	+ 2% Amyl Nitrate	+ 1-1½% Amyl Nitrate

It may well be found desirable to add a further ½% of Nitrate to fuels intended for 3.5 c.c. engines.

General Purpose Flying with ordinary 2·5—3·5 c.c. B.B. Engines.

e.g. E.D. "Racer", D.C. "Rapier", Frog 249 B.B., Frog 349 B.B.

Luxury Mix	*General Purpose*	*Economy*
17% Castrol R.	19% Castrol "Grand Prix"	19% Castrol "Grand Prix"
43% Ether	40% Ether	35% Ether
40% Paraffin	41% Paraffin	46% Paraffin
+ 2-2½% Amy Nitrate	+ 2% Amyl Nitrate	+ 1-1½% Amyl Nitrate

3·5 c.c. engines may require ½% more Nitrate than specified.

General Purpose Flying with 2·5 — 3·5 cc., P.B. Engines.

e.g., A.M.25, A.M.35, Frog 349 P.B., A.M.C.O. 3·5 P.B.

	General Purpose	*Economy*
	22% Castrol "Grand Prix"	22% Castrol "Grand Prix"
	40% Ether	35% Ether
	38% Paraffin	43% Paraffin
2·5 c.c.	+ 1½-2% Amyl Nitrate	+ 1-1½% Amyl Nitrate
3·5 c.c.	+ 2-2½% Amyl Nitrate	+ 1½-2% Amyl Nitrate

Mixtures for modern small diesels 0·5—1·5 c.c. P.B.

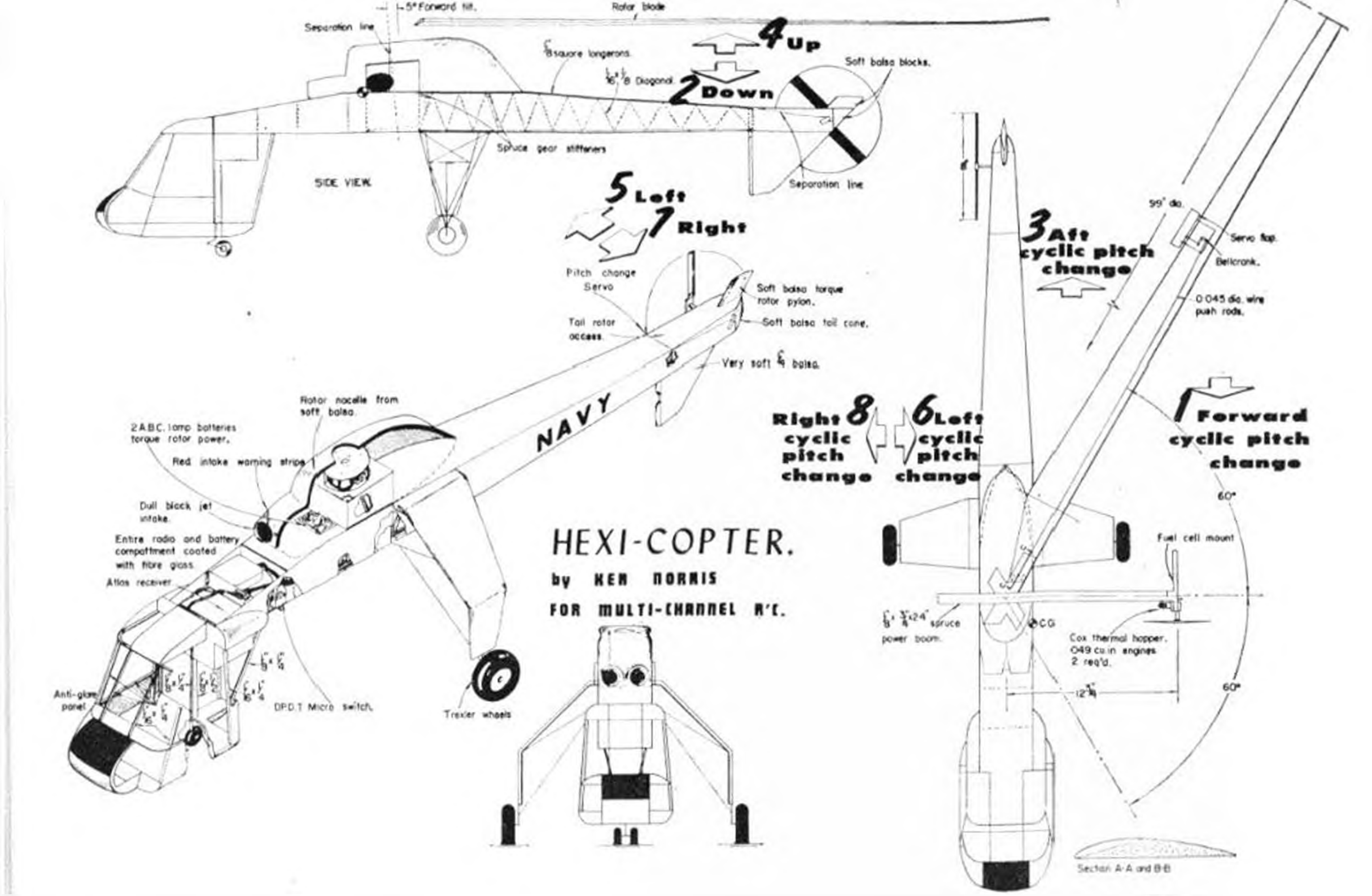
Castor Blend	*Mineral Oil Blend*
19% Castor Oil B.P.	22% Castrol "Grand Prix"
45% Ether	45% Ether
36% Paraffin	33% Paraffin
1-1½% Amyl Nitrate	1-1½% Amyl Nitrate

Mixtures for older engines.

e.g. E.D. Mk. II, E.D. "Comp—Special", Mills 0·75, Mills 1·3, E.D. "Bee", Mk. I, etc.

Castor Blend	*Mineral Oil Blend*
18% Castor Oil B.P.	21% Castor "Grand Prix"
43% Ether	43% Ether
39% Paraffin	36% Paraffin

The use here of Amyl Nitrate can be avoided, however, some advantage may be obtained by its use in very small amounts.



Eight channel HEXICOPTER by Ken Norris

MODEL HELICOPTERS have long been of great interest to most serious modellers, but the lack of information has made experimentation slow and often unrewarding. This model is the result of over three years' experimentation with many free-flight helicopter designs (excluding torque reaction). As one can see, this has not been an overnight project; it has been in the design and construction stages for over a year.

Past experience dictated several requirements: (1) The model must be designed with a high centre of gravity. (2) The rotor shaft must be supported as high as possible. (3) Space must be available close to the rotor head for the control mechanism. (4) The fuselage must be rugged yet light. (5) The landing gear must be capable of absorbing heavy landing loads.

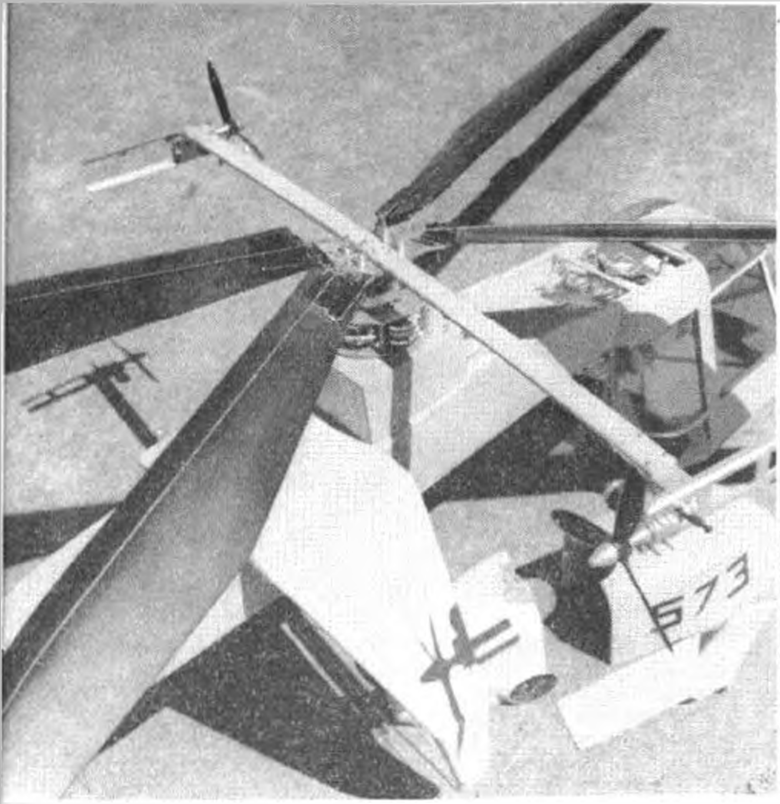
Since the S-64 on which Hexicopter is based hasn't been completed yet, details of its design are rather sketchy. The model presented here cannot be represented as true scale, but is based on the S-60 and written descriptions of the S-64. The airframe is constructed in standard model fashion. The receiver aerial is permanently installed on the right side of the fuselage and the electrical harness on the left side. Servos are trimmable Micromax motors of 60:1 gear reduction.

The FM Electronics, eight channel, superhet, three volt, Atlas receiver is connected to give the following control action with conventional designation first, then Hexicopter use in italics. 1. Advance engine, *cyclic forward*. 2. Down elevator, *collective down*. 3. Retard engine, *cyclic aft*. 4. Up elevator, *collective up*. 5. Left rudder, *tail rotor left*. 6. Left aileron, *cyclic left*. 7. Right rudder, *tail rotor right*. 8. Right aileron, *cyclic right*.

The rotor head functions can be divided into two groups, cyclic, and collective. *Cyclic* refers to the cycle of pitch changes encountered by each blade as it moves through each revolution. *Collective* refers to the pitch changes encountered by all blades simultaneously. The rotor shaft is free to rotate only, radial bearings are provided at both ends of the shaft, thrust bearings in the same locations are provided for upward and downward forces.

If we tilt the swash plate, each blade will have a different pitch change according to its position in relation to the swash plate, thus we achieve cyclic pitch by lifting the swash plate at some point, *i.e.*, the front of the fuselage. The rotor and swash plate are connected by various levers, so as a blade and the swash plate pass over the front of the fuselage a bellcrank is pushed outward, and as the same blade passes the rear of the fuselage the bellcrank is pulled inward. Now, to increase collective pitch (overall lift) we simply raise a collective pivoting which changes the pitch of all blades by the exact same amount for each blade, but does not change the main cyclic settings.

The blade hub is attached to the shaft and power beam so that all rotate as one unit. Blades are attached to the hub with plain hinges and roots reinforced with 0.030 in. aluminium plates top and bottom. Note the blade roots are cut off at thirty degrees; this is very important. Push-pull rods are mounted on top of the blades to destroy any laminar flow in that area; note the considerable wash out in each tip. When the bellcrank is pushed outward the flap must move upward. Since the blades have a horizontal hinge they are free to flap or



Above views show the Hexicopter with dummy turbine cowls removed to reveal the Nicad battery pack, receiver and rotor control mechanism. The power boom carries two Cox .049 engines, indicating low power needed for this system. Rods along blade tops actuate servo tabs for channels 2 and 4, climb, hover and descent

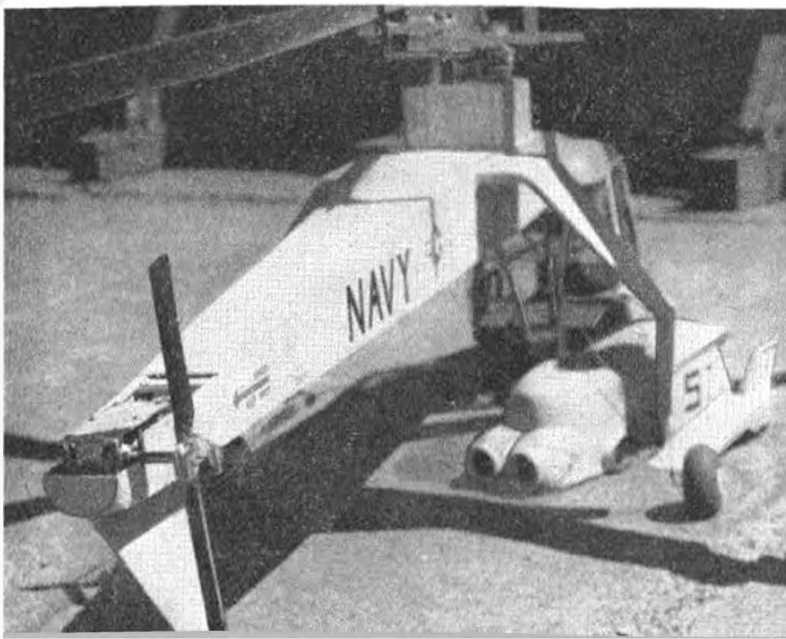
cone up, but not allowed to flap down past a line perpendicular to the rotor shaft. This coning of the blades also changes the angle of incidence of the blades due to the rake angle of the hinge (called the Delta Three Hinge). What Ken Norris is attempting to do is to control the cone angle of each blade individually, and all blades collectively. This is accomplished by using servo flaps which increase or decrease the lift of each blade thus controlling the cone angle and the angle of attack. To obtain insufficient vertical thrust for upward flight the cone angle is increased, as the cone angle is decreased the lift is increased. A test stand is under construction which will allow the rotor system to be "flown" on the ground, where the hazards can be controlled to some degree. Until he has some practical assurance the model will respond as desired, Ken has no intention of turning it loose.

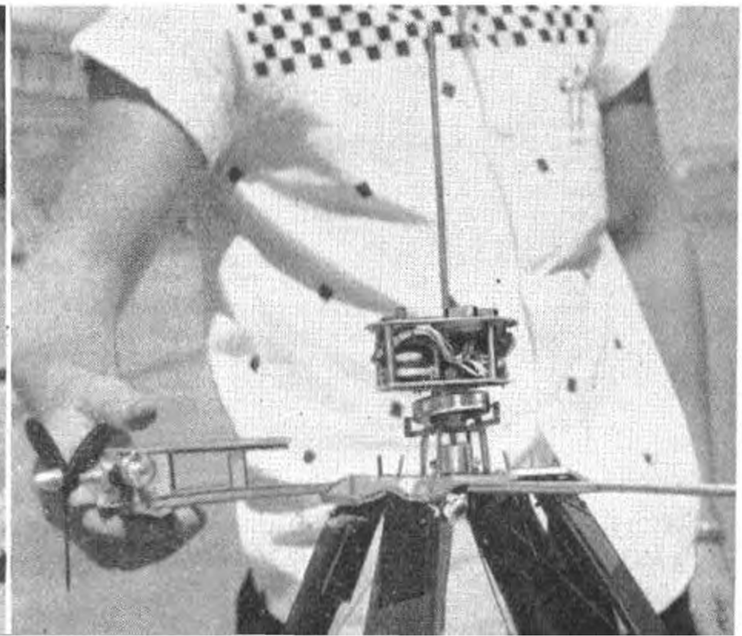
The spruce power boom has a Cox ·049 Space Hopper with pressure tank mounted on each end facing in opposite directions as they pull the rotor around. Three blade props must be used to reduce the rotor head height necessary to clear the fuselage during rotation.

Power on the anti-torque rotor is supplied by a Micromax motor of 14:1 gear ratio, geared up to 8:1, changing blade pitch. It is necessary to experiment to determine the centre of the pitch range as the rotor must compensate when in neutral for the small amount of torque transmitted through the rotor head to the fuselage. This unit is protected during tail down attitudes by the small sub-rudder.

The model is just the start of an extremely interesting and challenging undertaking which could reward its enterprising designer with great personal satisfaction. All that is really required to build model helicopters is sufficient desire and a little ingenuity. Ken hopes more will join him through the *American Model Helicopter Society* which he has founded. We would be pleased to forward enquiries regarding membership, which includes supply of regular news bulletins on model helicopter experiments from all parts of the world.

Below at left is the tail rotor with variable pitch actuated by geared Micromax to control torque and give right or left turn on channels 5 and 7. At right, the rotor is removed from the airframe and positioned inverted to display the control mechanism, swash plate and neatly contained Micromax servos centred around free running axis





AIRCRAFT DESCRIBED NUMBER 109

Colonel Roscoe Turner's

PESCO SPECIAL

Described and drawn by J. H. ROBINSON

In 1936 Colonel Roscoe Turner, whose *Wedell Williams* "57" was due for retirement, was having built a large mid-wing racer fitted with a high-powered twin-row engine. Design of this machine had been worked out at California's Guggenheim University and construction undertaken by Lawrence W. Brown of Los Angeles, who had already built three successful Menasco-powered racing aeroplanes. Dissatisfied with Brown's progress, Turner considered scrapping the entire airframe, but instead passed the aircraft to E. M. "Matty" Laird, of Chicago, builder of the *Solution* of 1930 and Colonel James Doolittle's famous *Super Solution*, to rebuild and complete. This accounts for its designation LTR 14 and its being originally known as the *Laird Turner Meteor*.

The Meteor's moderately tapered wing was in two halves and constructed entirely of wood, with two solid 14-ply spruce spars, plywood ribs, spruce stringers and fabric covered plywood covering, except for the metal covered leading edge. Each wing was attached to the fuselage with 16 bolts, and drag flaps were fitted to reduce landing speed. The wing had originally been of parallel chord, but was rebuilt by Turner and Laird with a greater root chord to increase its area and reduce the wing loading.

A conventional steel tube fuselage structure was plywood covered to the trailing edge of the wing except for the underside, where metal was used as protection from flying stones. The remainder of the fuselage was fabric-covered and the fin was built integrally with the fuselage. Outstanding was the slim single-strut fixed undercarriage fitted with streamlined wheels and tyres which presented little drag and avoided the added weight and complication of a retracting mechanism. The fourteen cylinder twin-row Pratt & Whitney Wasp engine produced 1,000 h.p. at 2,300 r.p.m. and turned a 9 ft. 6 in. diameter Hamilton Standard controllable pitch propeller. The oil cooler was mounted in a well-streamlined tunnel radiator beneath the fuselage close behind the wide chord NACA cowling.

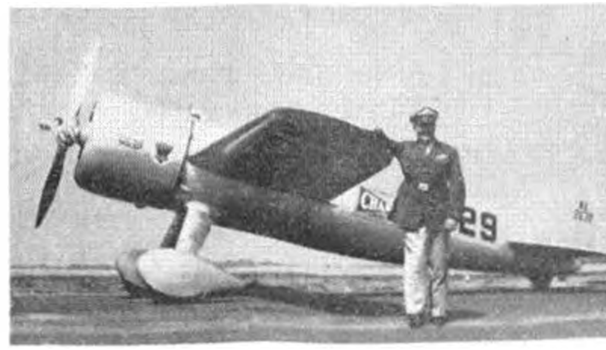
Meteor's first competition was at the 1937 National Air Races. A minor explosion in the fuel system forced its withdrawal from the Bendix Trophy Race, but Turner repaired it in time to fly to Cleveland for the Thompson Trophy Race, averaging 333 m.p.h. from Alberquerque to Cleveland. The Thompson Race developed into a duel between Turner and Earl Ortman, flying the twin-row *Marcoux-Bromberg*, until the beginning of the last lap when on the first pylon Turner was temporarily blinded by the sun and, under the impression that he had missed the pylon, returned to re-circle it. This put Turner, who had been wary of pylons since he finished first in the Thompson Trophy in 1933 but was disqualified for cutting a pylon early in the race, in third place behind Ortman and Rudy Kling who narrowly won in his *Folkerts SK3*. Turner's speed for the race was 253·802 m.p.h.

During the first half of 1938 the Meteor was modified to have large well-streamlined spats fitted to the wheels and two oil coolers, one above and one below the starboard wing, replaced the one originally fitted below the fuselage. At the Oakland Air Races in May a duel again developed between Turner and Earl Ortman who exchanged the lead several times during the free-for-all event. Ortman won at 265·593 m.p.h. with Turner second at 264·638 m.p.h.

The Meteor was fitted with Pesco oil and fuel pumps, and by the time of the 1938 National Air Races was sponsored by the Pesco organisation of Cleveland and re-named Pesco Special. For the Thompson Trophy Race at Cleveland Ortman again led Turner and the rest of the field for five laps until his over-boosted twin Wasp Junior engine began trailing smoke. Turner, whose engine by now was tuned to develop 1,100 h.p., finally lapped Ortman in the thirtieth and final lap of the race to finish first at a record speed of 283·419 m.p.h. His fastest lap was at 293 m.p.h.

For the 1939 Thompson Trophy Race the Pesco Special was re-named *Miss Champion* with a large replica of the Champion trade mark beneath the cockpit. In fourth place after a slow take-off, Turner missed a pylon on the second lap and turned back to re-circle it, becoming last in the field of seven. By the ninth lap his vastly superior power had regained him the lead from Tony Levier in the *Schoenfeldt Rider Firecracker*. His lead continually increased and he won the Thompson Trophy

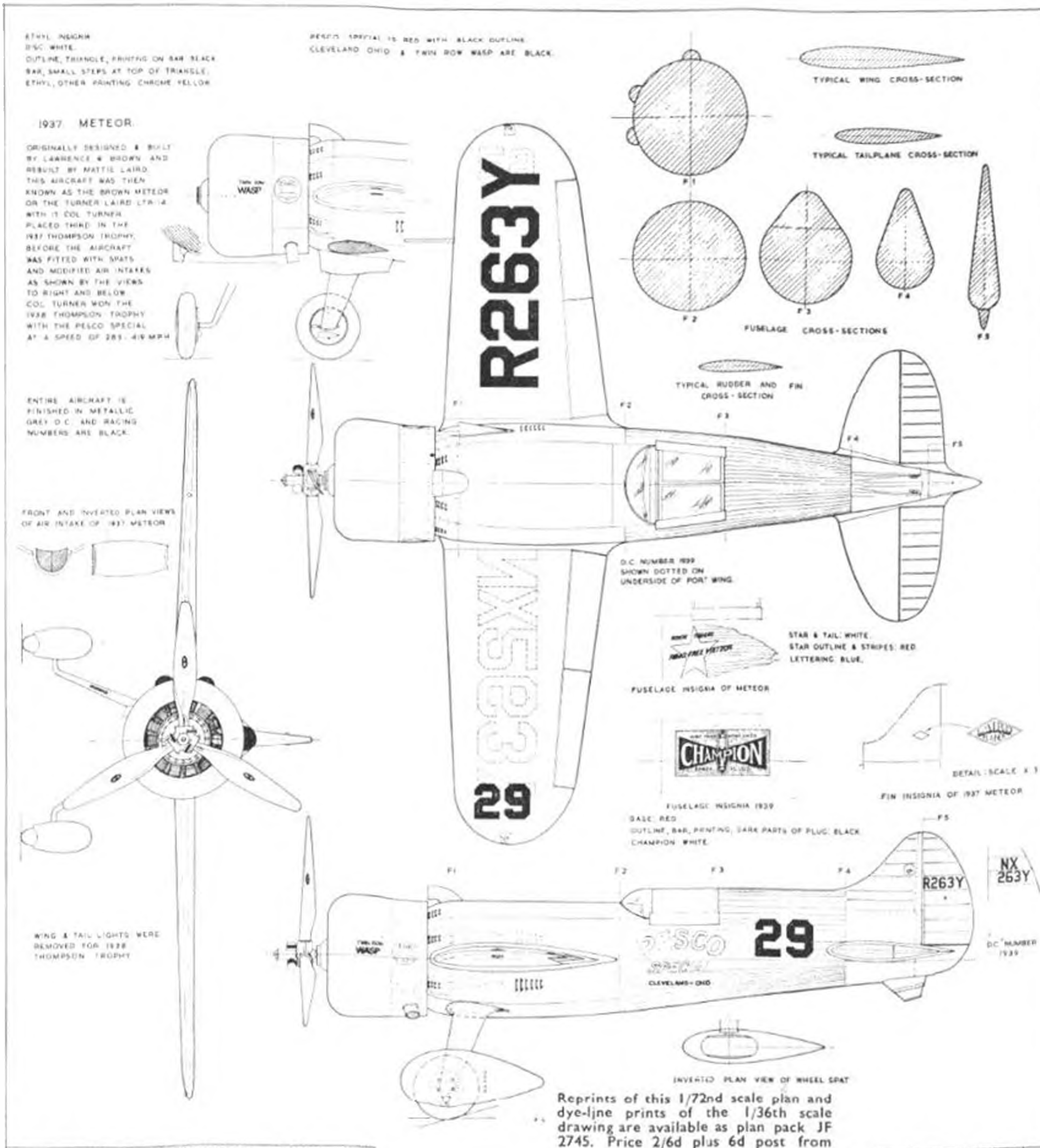
Top left is the 1938 Special as it won the Thompson Trophy of that year. Roscoe Turner won the Trophy no less than three times. Below, at Oakland in 1938 the Meteor first showed its wheel spats. Pictures by *A. Bachmann and W. Larkins*



Col. Turner with the final Special decoration as Miss Champion. Famous for his many great flights, including second in the speed section of the '34 McRobertson to Melbourne, he is now President of his own Aeronautical Corpn. at Indianapolis

for the third and last time at 282·5 m.p.h. After this race Turner announced his retirement from air racing and he has subsequently operated a flying school at Indianapolis.

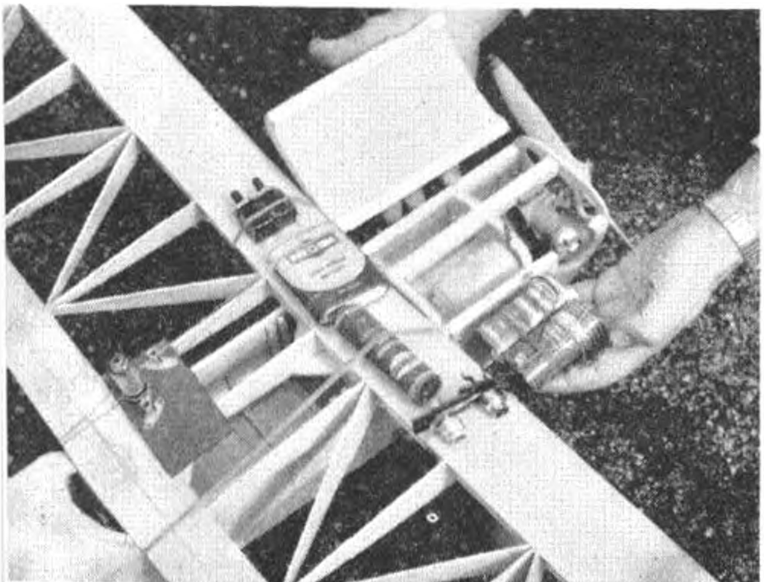
At least until recently the LTR 14 was hanging from the roof of the main hangar on this field. The Pesco Special (alias Meteor, alias Miss Champion) had a wing span of 25 ft. and an overall length of 23 ft. 4 in. Its empty weight was 3,310 lb. and loaded weight 4,933 lb., giving a wing loading of 58·81 lb. per sq. ft. The machine was at all times finished in metallic silver grey with racing and licence numbers in black.



Reprints of this 1/72nd scale plan and dye-line prints of the 1/36th scale drawing are available as plan pack JF 2745. Price 2/6d plus 6d post from A.P.S.

"Once upon a button"—or Simple Single

A novice's guide to rudder-only radio control using home constructed inexpensive gear — the IVY-AM



So YOU WANT to start radio control modelling? Well you are going to need some help, are you not? This series is to be a stage by stage instruction course on how to build, fit out and wire up a radio control model. Naturally, the radio equipment will be simple and inexpensive and for that reason we have chosen to use the *Ivy-A.M. Receiver* as detailed in the September 1960 edition of RADIO CONTROL MODELS & ELECTRONICS and available in kit form from MacGregor Industries. This copy of R.C.M. will be specially handy for readers following our feature.

The model selected as the "Guinea Pig" in our experiments is the *Veron Viscount* as this offers the right size at 54 inches span.

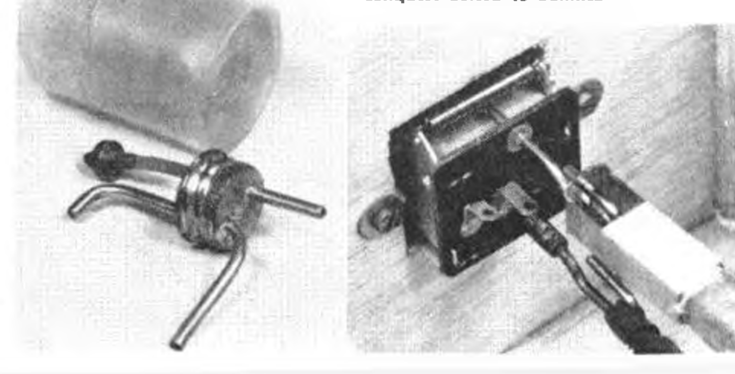
This, the first of the series will be given over to the preliminaries,—dispersing and laying out the radio equipment in the fuselage to best advantage. To do this we will suppose that the model is ready for installation. Thus the basic airframe will be complete.

We feel at this point that a mention of the *Viscount* as a kit to be well justified. Truly it is a fine kit. Obviously much effort and thought has been given to selecting the balsa, not only for quality, but for weight (all block being of low density balsa). The high degree of prefabrication includes pre-shaped and hollowed fuselage spine blocks and engine cowl, ready cut fuselage sides, die cut ply parts and wing ribs and shaped leading and trailing edges (leading edge hollowed and notched). Also supplied are ready shaped and drilled 12g. dural u/c 2½ inch dia. sponge rubber wheels and special "no-bend" high tension steel axle bolts. Construction wise the *Viscount* is simple to build, the afore mentioned prefabrication bringing building time down to a minimum. Altogether, a kit well worth one's finest efforts, and one which will add considerably to *Veron's* reputation.

Layout

The first thing to decide is where the radio components will be situated. It is most important that these be arranged so as to obtain the correct C.G. position. To achieve a satisfactory balance it is most convenient to assemble the airframe, and move the various components—receiver, batteries, switches and excapement along the fuselage so that the model balances properly. Batteries must be in front of the receiver, since in the event of a crash, momentum might cause the batteries to break loose from their fasteners and crush the receiver if the positions were reversed. Our photographs show how to

Left hand column top to bottom: Layout of components across the wing to be movable for C.G. trim. Note the polythene fuel tank behind the firewall. The H.T. batteries, held in the hand, go underneath the tank and are accessible from the fuselage underside. Receiver will be mounted vertically. Second down shows the test for balance at predetermined uncovered C.G. position. In lower, the model is lifted with fingers under spar and components shifted for balance



Plastic tank from Woolworths 6d. bottle, and Elmic Conquest bolted to bulkhead

balance and position components by laying them out along the airframe. They are held in place temporarily with rubber bands and if necessary, placed above the wing instead of underneath just for obtaining balance.

On a model the size of *Viscount* one can safely estimate a ⅛ in. to ¼ in. Centre of Gravity movement *aft* when covered so our aim is to get the bare model to balance that much *forward* of the final desired C.G. Thus, on *Viscount*, move the batteries, which in our case are as heavy as ever likely to be used (two B105, one D18 and a 4.5V flat battery—13 ounces) until the model balances comfortably on the rear of the main spars. We found that the D18 and 4.5V will go inside the main R/C compartment and the two B.105's in the designed battery section.

Installation

Having decided where all components will fit, they must now be secured in the fuselage. The first item to fit is the rudder-operating escapement, mounted on either a fixed or sliding bulkhead depending on preference. The normal position of this is just about level with the trailing edge of the wing. Be sure to fit size 00 Newey snap fasteners to the escapement on short leads or direct on the wiring tags before mounting to the bulkhead. Next make holes in the fuselage side for the switches.

These must be on the left side of the fuselage for a right-handed launcher, or opposite for a left-handed person. They must not be in a position where they interefere with internal equipment (batteries etc.) and preferably close to the battery compartment. They must also be clear from the meter socket, which in turn must be low enough on the fuselage to permit meter fitting with the wing on for tests with engine running and ready to fly. At these points it is a good idea to reinforce the fuselage inside with 1/16 in. ply (it is already on *Viscount*). Again switches and sockets should have long enough leads, ready for wiring up to a four pin plug in our case.

Battery packs are held together by means of adhesive tape and retained in position inside the fuselage with rubber bands and screw hooks, all connections will be by Newey snap fasteners. The last thing to arrange at this stage is the receiver mount ready to take the receiver. Naturally for convenience it should be easily removable and for that reason we will secure ours to a sliding bulkhead, (⅛ in. ply or 3/16 in. hard balsa), shock mounted with foam rubber, stuck to the bulkhead with Evostick. Together with the receiver, a four pin socket (for Ivy-A.M.) is mounted for battery link up. Next stage is to wire up and build the receiver, which we will deal with next month.

Other news—Shoulder Wings

Over in California the current U.S. Champion and long time top flyer in the Los Angeles Radio Kontrolers, Doug Spreng has been leading more events with his shoulder wing *Stormer*.

Doug's own opinion is that the shoulder wing configuration has the advantage of giving a smoother roll than the low wing type. In his own words, the idea that a fast model is smoother is *Phooey*. He also pooh-poohs the fancy theories on aileron design, choosing instead the ordinary surface hinge type.

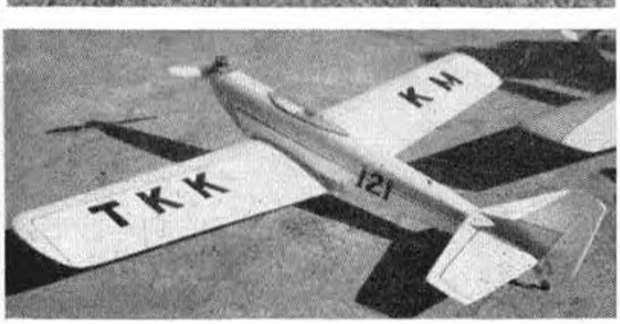
Now another model has come on the Los Angeles scene, and Doug has said that it will fly even better than his *Stormer*. Designed by Bob Palmer, the famous control line stunt flyer, with Dick Larsen and known as the *Gee-String* it is with particular pleasure that we announce its introduction into A.P.S. with full details in the July edition of AEROMODELLER. Shoulder wing with the distinctive stamp of an aerobatic expert's design thoughts emphasised in all its attractive lines, the *Gee-String* is going to be a very popular design.

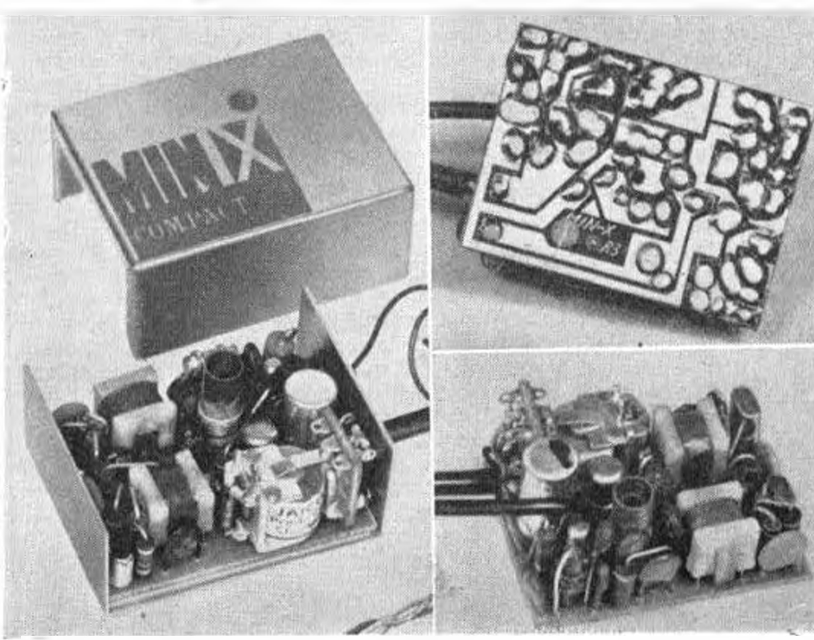
Min-X Compact

Encased in a stout gold anodised "can" the *Compact* receiver is neatly laid out, featuring all transistorisation with four transistor stages and a *Jaico* relay. The size of the unit is 2⅛ in. by 1 11/16 in. by 1 in. living well up to its name, and weighs only 1⅜ oz. out of its case and 2½ oz. all-up. Add to this the fact that the *Compact* is designed for very low voltage, in fact only 3 volts (two pen cells), then one realises the possibilities for really small models. Idle current (no signal) is 4-5 milliamps and current drain on signal, 25 milliamps on our testing.

Actually, receivers of this kind (3 volt operation) have been on sale in the U.S. for some time, but this is the first time we have had an opportunity of examining and testing such a unit with so low an input voltage.

Our initial impression of the *Compact* is one of extreme satisfaction, and for those interested, a more detailed and extensive test will be conducted in our July edition companion magazine RADIO CONTROL MODELS AND ELECTRONICS. Cost is 29.95 dollars and doubtless the *Compact* will be obtainable in this country through some of the import agencies who advertise as being able to obtain any American equipment.





Upper left: E. Clutton, designer of last month's *Kwod*, shows his diversity of modelling interest with *Trog Hog*, 42½ x 10 in. wing, 4½ lb. O.S. Max 35 (Yes!) 90 degree elevator Galloping Ghost model with Rowell receiver and symmetrical 0 degree incidence wing — Wow! Lower: K. Mabuchi's (T.K.K. Motors) K & B 45 *Orion*, winner of first all-Japan R/C contest. Right: Views of the *Min-X Compact* receiver.

Flying Enterprise

A 51½ inch. span contest winning A/1 from bonny Scotland

by Colin Campbell

In 1950 when Aeromodeller introduced a series on design, I began the evolution of originals in the three main F/F classes which evolved into my present "stable" of competition models. Of first designs, most successful were A/2 and lightweight gliders, both of which ended in the sea. On January 31st, 1954, we had our first local event using the 164-ft. line. The lightweight I entered flew right over the town on the third flight, winning the competition, but was never retrieved.

Date of the summer competition for which this glider had been built arrived to find me committed with other models, so in a last ditch effort to have a glider I converted an old Wakefield wing and tailplane fitting it to a sheet fuselage to make a tolerable glider, and this "bitsa" managed to scrape top place with thermal assistance. "Bitsa" was promptly dubbed "Flying Enterprise" after the news headline story that year of the saga when Captain Carlssen stayed aboard till his ship sunk under his feet in the Atlantic.

When Aeromodeller introduced the A/1 formula to this country in 1955, "Flying Enterprise" was modified with old Wakefield wings and tailplane and flew until long overdue for replacement despite the fact that its R.A.F. 32 wing-section was hardly suited to a competition A/1.

The "lightweight" Sigurd Isaacson 53009 wing-section and the present A/1 which lay incomplete until late 1959 incorporated a section vaguely similar to Isaacson's, but drawn with French curves to suit spar positions I had chosen. This new "Flying Enterprise" — which has taken two local competition firsts to date and did a max on its first flight on New Year's morning — was given a Warren girder wing and tail structure because a trial of geodetic wings proved overweight and lost the section profile without riblets. The Warren girder was an attempt to compromise and with good quarter grain 1/32-in. ribs it gives a strong springy wing of quite high aspect ratio. Tailplane is still much of a rubber duration type with Warren layout. The fin also escaped from my rubber duration collection while the rudder hinge is more substantial than thread or tape affairs. Built up fins seem to do better than solid sheet. Laminated wing and tail tips were used for their neatness and strength.

Fuselage is a box. Lead noseblock saves having excessive length forward of the wing leading edge, while turned up effect is for towline stability. I have this on my A/2 also and it seems to aid a dead straight tow. This was one reason why an underfin was omitted.

The old block and trigger auto-rudder was used, as I found that in my other gliders the two-hook and auto-rudder combined variants were inclined to work prematurely and be anything but "positive". If properly done, the former type is far better I feel. By regulating size of block and trigger slot, tow trim of rudder can be adjusted easily.

The current design has two flying seasons behind it and is a trifle overweight at 5·5 oz. The one I am building just now looks as if it is going to need a spot of ballast as the airframe is slightly lighter.

Construction

Make templates for wing and tailplane round tip laminations by placing greaseproof paper over and carbon paper under plan and tracing through to a piece of ¼-in. sheet below. Fret-saw and sand sheet templates to shape. To make a pair of tips cut out five 7/16-in. x 1/32-in. strips for laminating. Use plenty of cement between four strips and use fifth to protect others from steel pins holding winding in place against the template. Leave to dry overnight as laminations take a long time to harden. When dry, cut the winding horizontally carefully using fret-saw off the bench in the hand to make two matched pairs of tip laminations for wings and tailplane.

Trace out wing and tailplane rib templates on to 1/32-in. on 1 mm. ply also leading edge section templates. Make sure templates are cut out accurately to correct height and length. Note that slots are wider than cross-section of spars because ribs are set oblique to spars. Use strong and light quarter grain sheet for ribs. Save minutes by cutting out ribs two at a time, but don't angle your razor blade to one side.

Always remembering to protect the plan with greaseproof paper, lay out the wing components. Sand leading edge to rough quarter circle section, but completely finish shaping and smoothing the trailing edge. Pin down trailing edge and mark off rib stations. Notch same to 1/16-in. deep and replace on plan with front side raised 1/16-in. off plan by strip of 1/8-in. x 1/16-in. laid underneath with 1/16-in. protruding right along for pinning.

Set up leading edge over plan, keeping pins clear of joint positions then set up at least one pair of pins to each rib, preferably between line of spars right along. No spars should be laid down yet, but insert and cement all the oblique ribs making sure spar slots are in a straight line. Lay in top spar dry, look along length of spar and true up by enlarging some slots if required. Cement in top spar and see the top of it is flush with the top of the ribs. Sand one end of lower spar to slight wedge shape and it is easy to slide it in underneath right along in the line of rib-slots. Do this to check for straightness. Cement either side of lower spar/rib-joints and work in cement by sliding spar from side to side. Cement on tips which are flat on plan at lower spar positions, rising to 1/16-in. up at trailing edge support and curving back down to flat at rear of trailing edge. Cut top spar short at last rib and add another piece at a declining angle to join up with tip which is same height as spar width. Having left them to harden overnight, lift off all four wing panels and inspect minutely for "dry" joints and re-cement where required. Next sand leading edge to final shape using the negative template to check for correct profile. Don't damage ribs. Angle up and using pre-cementing, fix dihedral joints in usual manner. Original was assembled all in one operation although each of the three joints could be completed separately. When joints are dry cut away 1/32-in. spaces in the ribs at dihedral joints for ply braces and insert same using plenty of cement. Add the three joint ribs, the two riblets and the gussets. Remember to reinforce trailing edge top and bottom with celluloid at centre joints also top of leading edge to prevent the retaining bands breaking through in a rough landing. Check again for dry-joints and remove any projecting spots of cement. Wings are ready to cover.

Tailplane is built similar to above and add d/t hook well cemented in before covering.

Always balance amount of cement used on either side of rib joints to prevent twisting and never force a part into place.

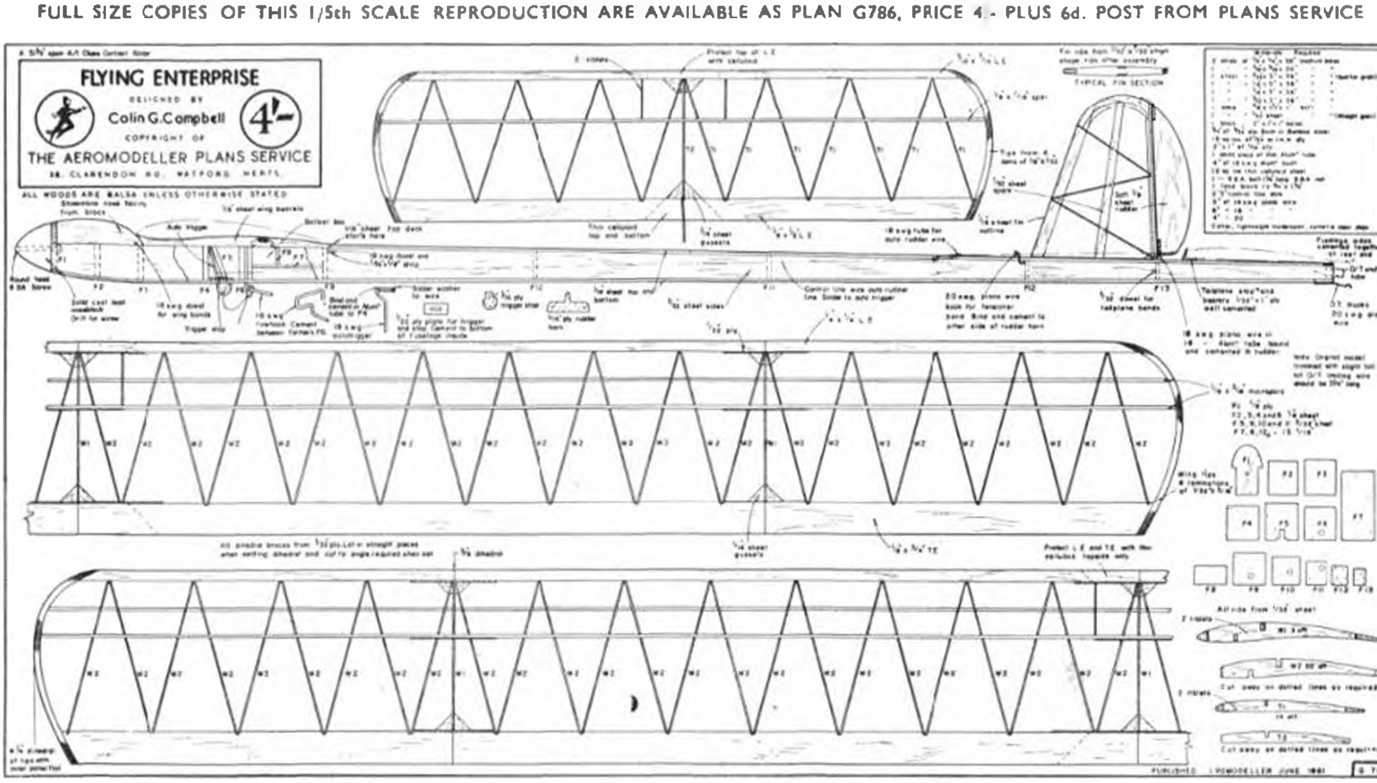
Use a 50/50 dope/thinner mixture on all flying surfaces with at least three coats on wings. Original was finished with a mixture of equal parts thinners, dope and banana oil for waterproofing.

Fuselage is built from two basic 3/32-in. sheet sides laid down inverted during fitting of formers. Plot and cut holes in formers for auto wire before inserting. Check fuselage for straight and lay on 1/16-in. sheet under-deck working swiftly using sufficient cement to ensure it is properly stuck on and be careful not to crack it on curve at front end. Weigh down over completely flat board when setting and when dry sand off surplus sheet of underdeck. Thread auto wire and knot temporarily at each end with a large loose hitch. Insert and secure all piano wire, tube and ply accessories including towhook, bound and cemented in. Don't forget the tube for auto wire at lead-out near fin. Make sure the 18 g. auto-trigger lever is a free fit in its tube hinge. Retain with a soldered washer. Get a lump of lead from the plumber. Saw and file to shape. Drill and bolt on to ply nose former with a rubber-based glue between lead and wood. Fit nose faring wire wing saddles and top fuselage deck also the 1/8-in. faring-cum-wing-mount.

Fin outline is not wound, but built up in traditional manner. Note 1/32-in. farings on fin top. Ensure rudder hinge has end and side shake, parts anchored well in and generally free from mechanical fault. Double cement control horn for rudder. Attach fin to fuselage and check for vertical before finally cementing in.

Cover and dope wing, tail and fin. Mount wing and tail on fuselage to balance. File lead noseblock until the C.G. is in correct position. Cover and dope fuselage. Link up auto-rudder. Adjust for turn using pin bound with thread and cemented vertically in fuselage beside horn (or with balsa 1/8-in. block according to your custom). See trigger stop is a free fit for quick release. The original flew "off the board" with wide right turn and a touch of tail tilt, port tip down. Don't forget that d/t snuffer and light up *every time* because you have a real man-size A/1 on your hands!

FULL SIZE COPIES OF THIS 1/5th SCALE REPRODUCTION ARE AVAILABLE AS PLAN G786, PRICE 4/- PLUS 6d. POST FROM PLANS SERVICE



New Zealand kits by Kingsway are attractively boxed as seen at left. Drawings show, top left, Little Sioux 19/11; top right, Twinkle 14/6; bottom left, Minifly 9/11 and Pee Wee Spcl. All prices are Local NZ figures

Trade Notes

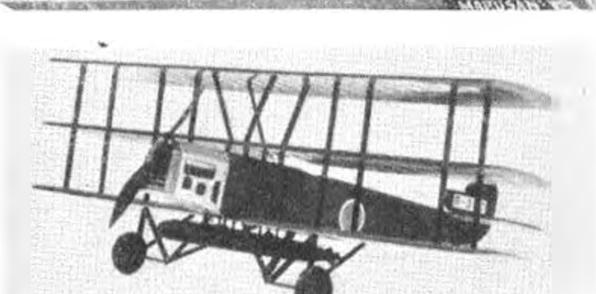
THE MODEL TRADE FEDERATION (F.M.A.M.W.) is anxious to collate information on negotiations which have taken place between clubs and authorities for use of public land, park areas, etc., for model flying. Anyone who feels he can assist is invited to send details to us for forwarding. This is a welcome but late move to help the aeromodellers, somewhat overshadowed by the Merco efforts to produce their cure to the basic problem of noise. We recently witnessed a test with a Merco 35 in a Mercury *Crusader* fitted with a prototype silencer which completely reduced noise at a distance 200 yards downwind. Tooling will delay production; but here at last is something *done* about the matter, and it only cuts r.p.m. by 200.

A batch of sample Kingsway kits have been sent to us for review from Auckland, New Zealand. Each is for a small model, control line and rubber-powered types, using fully prefabricated die-cut balsa sheet parts, plastic parts and ample instruction though the plans are somewhat rudimentary. However, that is not to say that anything is left to the imagination. Taking the novel *Pee Wee Special* as an example, we find the 12-inch span all-sheet c/liner well considered in every aspect and have no doubt whatsoever that the same design would be a "natural" best seller along with its popular powerplant in the British shops. Australian stockists have received Kingsway kits most favourably and no doubt have contributed to the demand for Kingsway to produce F.A.I. racers and 60-inch R/C or 2·5 c.c. flapped stunter designs. Unfortunately for New Zealanders the market is too limited for such ventures.

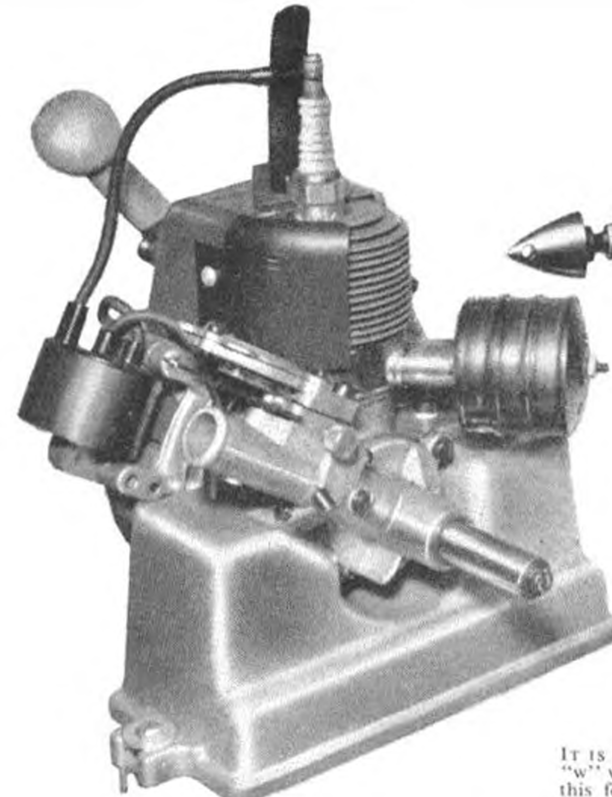
When we mentioned the Japanese Marusan plastic kit for the *Hien* (Tony) fighter recently, we were inundated with requests of "Where can I get it?". Now we have made up another example which came by way of Charles Cain, Hon. Sec., London Society of Air Britain, who got it for the Napier Co., producers of the engine in the remarkable fullsize aircraft. This is really a collector's piece in the shape of the Mitsubishi Type 10 Triplane torpedo bomber, and for those interested we can supply as part of our readers' service, a listing of the Marusan range with prices. Enclose an S.A.E. for reply (the Tripe costs 7/6).

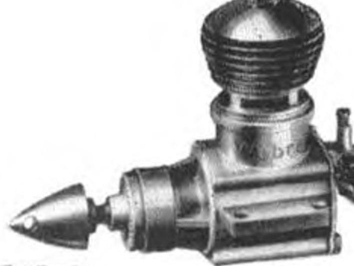
LePages are introducing a new size in balsa cement tubes to add to their range of useful adhesives and retailing at 6d. each. It will be known as Super Balsa cement and is specially launched to meet the needs of those who prefer to buy in small quantities. Another change in cements is announced by Humber Oil in that the popular Britfix line is being restyled as Number 66 in a redesigned tube decoration. Prices remain the same at 6d., 1/- and 1/8, the latter for two-ounce.

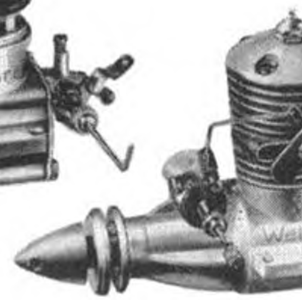
As readers will have noted in the shops, Airfix have spread their wings and a Rolling Stock range for Loco enthusiasts has been occupying the presses with 00 scale accessories, latest being a Mineral Wagon at 2/- and a 79-part Diesel Loco Crane at 3/-. Fighting vehicles to the same scale (and matching the popular soldier figure sets)are imminent, and now we learn of a completely new line, the Modern Cars series at 2/-. Starting with the Sunbeam Rapier, these are all 1/32nd scale with from 35 to 60 parts. All of which sounds as though the aircraft wing has been clipped; but this is not so, for the busy development department at Airfix has no less than six new types on the stocks for release in 1961, including a real surprise set for the ardent collectors. Traders who want to be up with the latest from Airfix will be able to see a Stockroom Exhibition at Queen's Hotel, Manchester, on May 23rd, 24th and 25th, coinciding with the KeilKraft North Western Trade show at the same hotel. K.K. also show at the Grand Hotel Birmingham, June 12-15th.



Marusan kit for the Mitsubishi type 10 Triplane has a fine box lid painting, full instructions in Japanese and takes from seven hours upwards to make. Quite a change from other plastics! Parts are seen in picture below

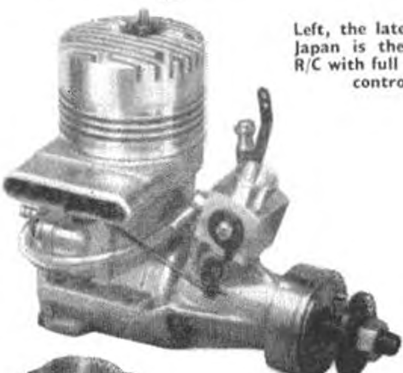




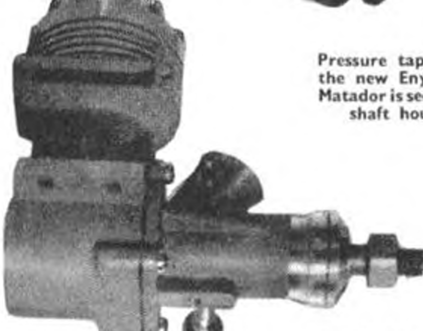


Above, the three new Webras: at left, the O and R Compact 21 c.c. industrial unit complete on tank mount for £14. Photo not much less than half size. Will be a 'natural' for marine enthusiasts

MOTOR MART



Left, the latest from Japan is the OS 49 R/C with full throttle control



Pressure tapping on the new Enya 35-II Matador is seen under shaft housing

Duke Fox's simple .07 will be popular as an easy handling inexpensive stunt motor

IT IS QUITE amazing what one little letter "w" will do if it fits in the wrong place in this feature. Last month we revealed the P.A.W. 19D and whereas our intended caption read "this is *no* bored out 249" the word no became *now* and of course a lot of people thought we had left out an "a" so that in their impression the caption read that the 19D was now a bored out 249. Also this has meant that the industrious **Eifflaenders** at Macclesfield have had dozens of enquiries for overboring the 249. In fact, beyond the prop nut, washer, driver, backplate, needle assy. and compression screw, there is nothing in common between the established 249 and the new 19D. Our close up picture illustrated the thick liner in the enlarged crankcase body. Shaft, piston and fins are altered and quite definitely, the 249 *cannot* by made into a 19!

There is some indecision as to the eligibility of the diesel in F.A.I. speed events which will have to be thrashed out by the officials, but in the meantime it is interesting to note that Ray Gibbs used an **ETA 15 D** to place 2nd at the British speed team trials (101.7 m.p.h.) and Larry Palmer of Strathmoor M.A.C., Michigan set a new A.M.A. record with an **Oliver Tiger** at the March 26th U.S. speed trials. Will the diesel match glow?

Loads of new engines are out this month. The long awaited **O.S. Max D-15** Racing Glow is off the production lines, one novel feature being the weighty drive washer *cum* mini-flywheel which pegs to the back of the prop, a feature being also common to the **49 R/C** along with the rear needle. This leaves the barrel unobstructed, and the exhaust is controlled by a butterfly valve pivoted in the centre of a generous and what must be a close fitting stack. The 49 R/C sand cast prototypes are out on test, no doubt spurred on by the success of the **K & B 45** in the Japanese Championships for Multi channel. Another new engine from O.S. is to be 1 c.c., with release about August and from Saburo Enya, the **Enya .049** will be similar to the simple 06 glow but with four screws holding the back cover, instead of two.

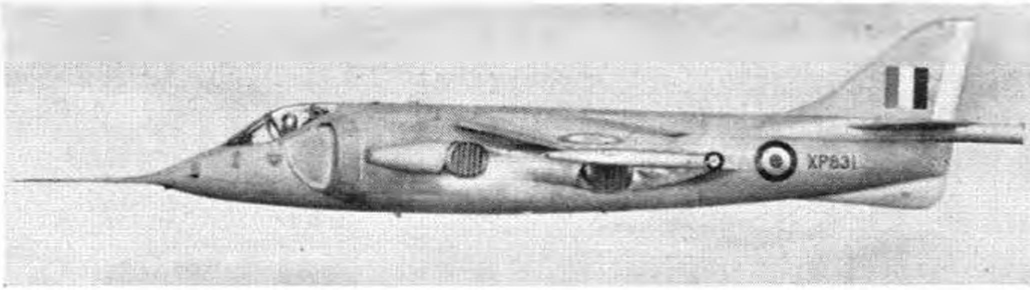
From **Webra** in Berlin, three new types including the **Big Ben 5** with coupled exhaust and throttle for radio control work and featuring unusual double fluting cast into the sides of the main shaft bearing. These shaft stiffeners are a feature on all Webra products and are larger than ever on the new **Winner II,** a 2·46 diesel with intake throttle claiming 0·26 b.h.p. at 13,000 r.p.m. This is a long stroke engine, bore is 14 m.m. and stroke 16 m.m. whereas the Big Ben is way over square with 19 m.m. bore and 17 m.m. stroke. Third new Webra is a glow variant of the **Bully 3·44** with throttle rear intake.

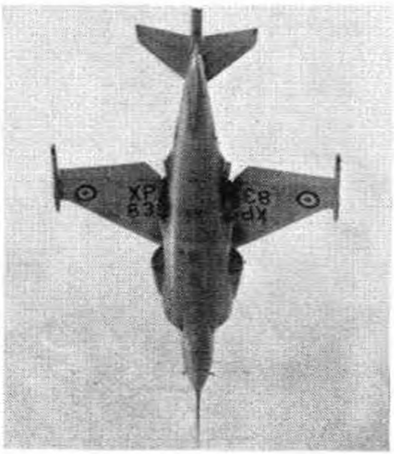
Duke Fox has another new product in the ·07 Compact Stunt Motor, specially designed for smaller stunt models and in which the emphasis has been on easy operation and low cost. Price in U.S.A. is **$5.95.** Aimed at swinging a 7 x 3 at 12,000 r.p.m., the 07 is not much larger than some 049's though considerably more powerful. It has the features of earlier Fox products with the plug element integral with the head, and a crankcase shape not unlike a scaled down early 35. Cylinder porting is generous, bore being ·46, stroke ·42 in. in a thick liner with but one transfer passage cut between exhausts and having about 95 per cent. overlap.

Because the increased demand for the **Taplin Twin 7 c.c.** diesel exceeded all expectations to the extent of using up all stocks of parts sooner than expected, there will be a break in production of about six weeks before the new Mark 2 version appears with latest modifications. The 7 c.c. engine production run is completed and henceforth the "TT" will be 8 c.c. with bores up to ·705-in. and roller bearings replacing the former phosphor bronze shaft bearing. Prototypes have been operating most successfully over a period of months, and a particular feature of Colonel Taplin's latest engine is that Mark 1 owners will be able to have conversions made to Mark 2 standard with increased capacity and power.

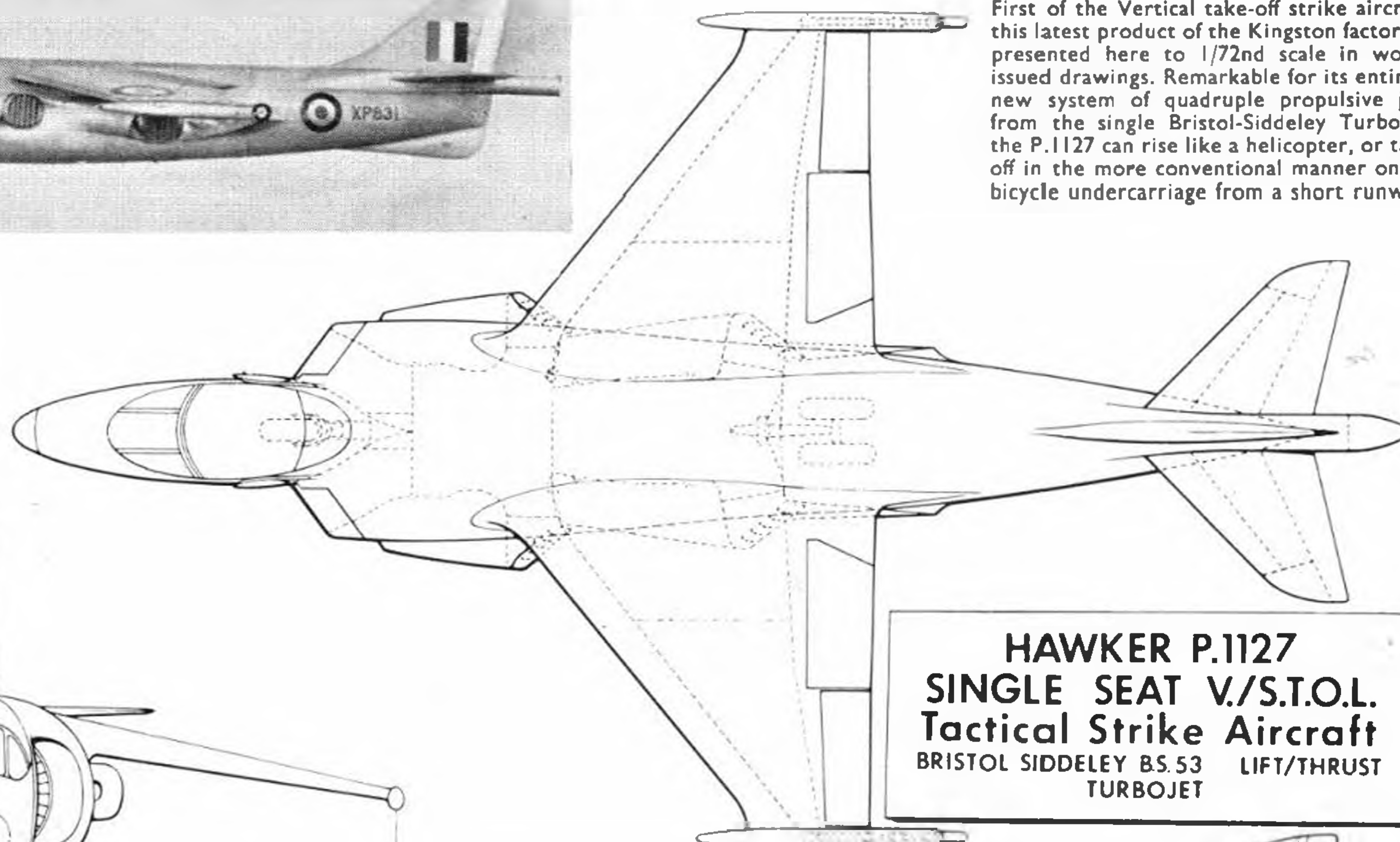
Want a 21 c.c. engine with muffler, tank mount, magneto, throttle and starter for £14? The **Ohlsson & Rice Compact** is now imported for industrial use by **Trojan Ltd.** and sounds to us like a terrific bargain for those who desert flying models occasionally for boats. Only 5¼ in. high, it develops ·75 b.h.p. at 6,300 r.p.m. and will be made in Britain under license.

Cox Tee Dee 15 breaks 16,000 on an 8×4! Close-up reveals the bell section head contour and view below shows black plastic carburettor housing. British supplies expected soon!



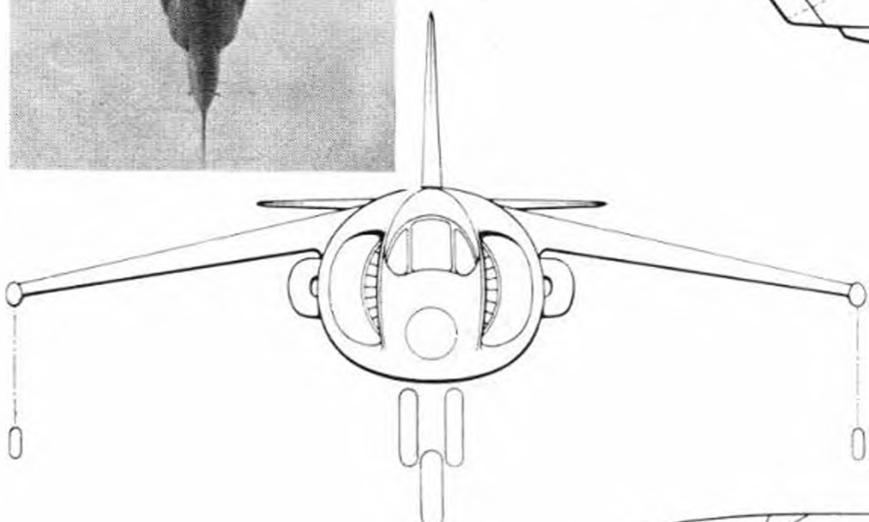


First of the Vertical take-off strike aircraft, this latest product of the Kingston factory is presented here to 1/72nd scale in works issued drawings. Remarkable for its entirely new system of quadruple propulsive jets from the single Bristol-Siddeley Turbojet, the P.1127 can rise like a helicopter, or take off in the more conventional manner on its bicycle undercarriage from a short runway.

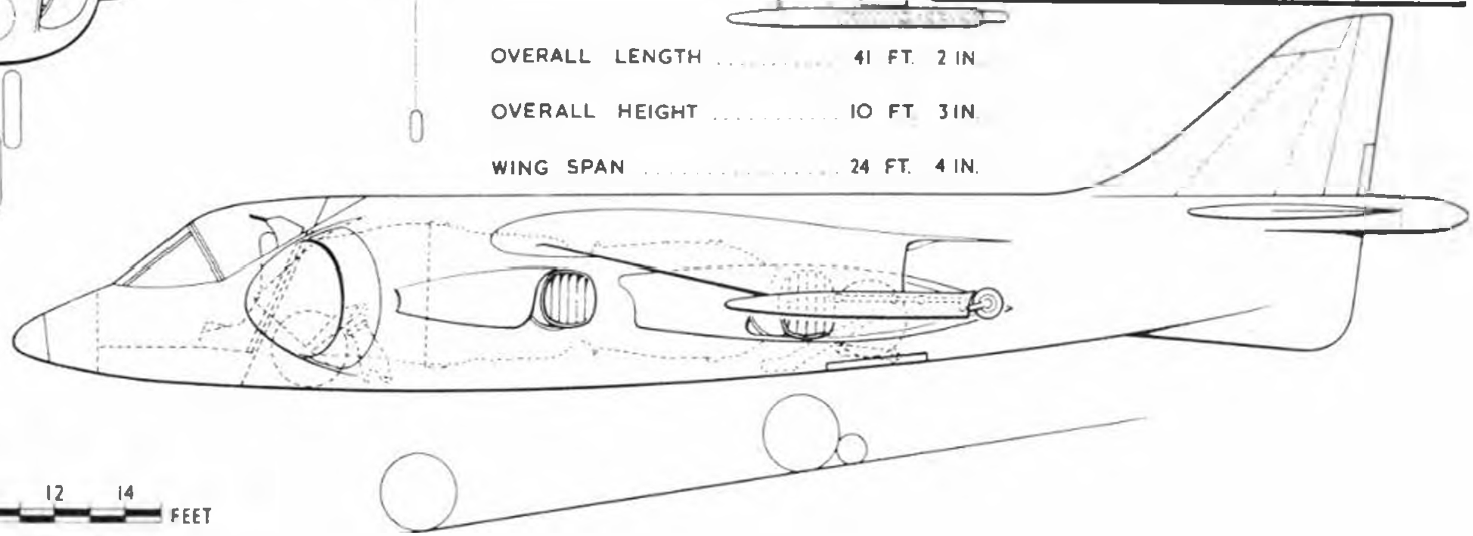


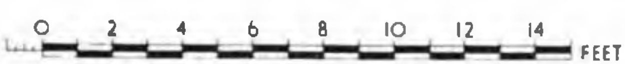
HAWKER P.1127
SINGLE SEAT V./S.T.O.L.
Tactical Strike Aircraft

BRISTOL SIDDELEY B.S.53 LIFT/THRUST TURBOJET



OVERALL LENGTH	41 FT. 2 IN.
OVERALL HEIGHT	10 FT. 3 IN.
WING SPAN	24 FT. 4 IN.





Club News

London

FOR THEIR EXHIBITION held at the Wigan Hall, East Sheen, **RICHMOND AND D.M.A.C.** members assembled an impressive array of sixty models. Unfortunately attendance was poor, due to lack of advance publicity, but the Club still broke even. Their Easter F/F Comp., held at Chobham Common, was won by John Dumble flying a *Dixielander* with two maxes' in four flights. Runner-up was Mike Spires' *Spaceman* and third, Paul Price with another *Dixielander*. At Dagenham, John Perry came fifth in Stunt but the boy's efforts in "B" combat seemed to be quite worrying to F.A.S.T.E. members. The Club now meets at the Wigan Hall, East Sheen, on Fridays.

CHINGFORD M.F.C. had a very promising start to the season at Dagenham rally; one of their juniors eliminating Northwood's Tribe and another reaching the semi-finals, only to be knocked (!) out by Gus Johnson. This club would like to know which is judged in Combat, the pilot or the model ? The club has found that with little modification an *Ebenezer* will accommodate an A.M.15—(*duck*!).

HAYES AND D.M.A.C. started the 1961 season with the A.G.M., nearly 40 members turned up and they seemed satisfied, at least there were few changes of office. Both A/2 eliminators were well supported and in the S.M.A.E. Cup, Robin Sleight placed 2nd in London Area; their only Astral entry (F.A.I. Power) was plagued with timer troubles while getting down to 10 secs. The C/Liners who went to Dagenham, returned without prizes. Dave Balch was their best entry reaching into the 3rd round of both "A" and "B" Combat. John Brailsford, complete with broken leg encased in plaster, flew in Class "A", but was just knocked out in round two. There is new activity in the speed circles, John Taylor having reached 94 m.p.h. with a *Holland Hornet* on 35ft. lines, and Dick McGladdery 131.5 with his ETA 29 Mk. 6.

FELTHAM D.M.A.C. were out in force at Dagenham. Their highest placed member being Allen Dell, who came 3rd in the Class "B". The newly formed stunt team of Fred Guest, Bob Upton, Mike Birch and Frank Bradley, also did well but not well enough, so now they are feverishly practising for the Gold Trophy.

NORTHWOOD M.A.C. held its usual F/F meeting on Good Friday, which was extremely well attended. Brian Jones won scramble with 12 out of 30 mins. Dick Pratt the prevision, missing the mark by three secs., and Ron Green won the chuck glider with five consecutive flights of about 40 seconds. Performance was disappointing in combat at the Dagenham Rally, Bruce East being the only one to reach the semi-finals. Congratulations go from Northwood to Gus Johnson on his great effort in winning both classes, and also to the organisers for a well run contest. **DAGENHAM M.A.C.** held its 6th annual combat rally on April 9th. Competitors came from far afield and enjoyed themselves dispite the poor weather. Quality and quantity of the stunt event was first class, being run in the capable hands of Bill Morley, who kindly gave his services for the day. The .35 class combat seems to be gaining popularity (28 entries); the pace being fast, but not so destructive as one would imagine. In 3.5 c.c. combat, the F.A.S.T.E. club had two fly-aways! One landed on a roof 500 yards away, the other tried to go into orbit, then dropped like a stone, but both these models were flown in the following round. Then Brailsford, of the Hayes club, turned up with his leg in plaster; but flew his model, being pig-a-backed by D. Balch, who felt rather saggy at the knees after five minutes. The club is sorry they had to turn away so many entrants in this class, but 84 is more than most rallies can cope with. So please, enter earlier next year.

Results:—Stunt—1. R. Brown, Lee-Bees. Combat—Class 3.5 c.c., 1. G. Johnson, F.A.S.T.E. Combat—Class 3.5 c.c. ins., 1. D. Pickerton F.A.S.T.E.

ST. ALBANS' M.A.C. Latest piece of equipment is a portable litter box. Made by one of the members, it based on the lines of a womans' shopping basket with wheels and towing handle and dimensions allow it to be stowed in the back of a car. The front face is suitably decorated with the club's name and a model silhouette and it is felt that if this idea was generally adopted by clubs to take away fuel cans and streamers, etc., it would be a step towards retaining hard fought for flying grounds. (Would be invaluable at the NATS.!) The club F/F Gala will be held on August 13th at Chobham and comps. will be held for the following classes, Rubber, Power, Glider, ½A, S/C Radio Spot and Slope Soaring. The club room is open most nights of the week, club night Thursdays at 7.30. Any modeller or prospective modeller in the district can be sure of a warm welcome at 96A Victoria Street, St. Albans.

North Western

A recent influx of new members into **LIVERPOOL D.M.A.S.** has helped to strengthen the club's activities especially on the control line side. Several interesting new models have been seen recently, notably M. Broadbent's *Stuka* stunt. The club has recently had complaints about interlopers using their flying field at Burscough and would like to point out that only current members have permission to fly on the airfield.

URMSTON AND D.M.A.C. ranks have swelled to 80 members. They have two radio-control enthusiasts, whilst the rest are keen on control line combat and stunt. The local council are to give them a new flying field, also a hut has been offered, but this has been turned down because of the chances of theft.

This year the old style, *Topscore* is out in **WALLASEY M.A.C.** The new A/2's being built feature increased aspect ratio and elliptical tips. Wings are mounted on pylons and fuselages are slimmer. John Hannay's A/2 following this trend has a better performance than the other type and it is by no means a calm weather model. Len Hutton's latest is the most extreme of them all so far, with a stressed 84in. span wing, pylon incorporating a clockwork d/t timer, and triangular fuselage. The wing is so thin there is no room for a box—the dural tongue just slots into the wing ribs.

CHESTER M.F.C. are organising the Clwyd Slope Soaring Contest on Moel Famau Nr. Mold on July 2nd, 1961. (*Shame*! Clashes with Northern Heights—*yet again*! !) Entries 2s. for Seniors and 1s. for Juniors. Fuse type d/ts will *not* be permitted and entrants must produce evidence of insurance. A bronze medal will be presented to the winner in A/2, Open Radio and Junior. With the exception of R/C four flights may be made and the best individual time counting, the best individual time of the three uncontrolled classes will be eligible for the Gosling Trophy. For the R/C Class pre-entry by June 20th is required and entries on the day will not be accepted. A valid R/C license will be required. For further information contact C. R. Filtness, 26 Raymond Street, Chester.

South Midland

With one eye on the various trials **WATFORD WAYFARERS M.A.C.** members are busily ironing out their models for this year's contests. At the moment most interest is centred on A/2s, Open Rubber and F.A.I. Team Racers. 6.30 a.m., March 5th, found half a dozen members putting in some final trimming at Wheathampstead. G. Kent's Open Rubber model unfortunately found an unclimbable tree, but a visit to the local fire station proved most helpful. The fire tender, complete with six fully equipped firemen, duly arrived, but unfortunately as soon as the ladder was placed on the tree the model fell out. Geoff is now sweating on a £5 fee for calling them out. At R.A.F. Henlow, the Pilcher and Gamage were flown off. After five first round max's. hopes were high. Alas, Brian Dowling (last year's Pilcher Winner) fluffed his third flight after two max's. Geoff Kent, following his eventful start, made 2.41 followed by two max's. to lose his venturesome model in the Gamage. Jack Purssell made a creditable 10.22 with his second string Rubber model. Top club Pilcher time was T. French's 7.00 mins.

After a little count up **WELLINGBOROUGH M.A.C.** have only 18 members, so few for two such good flying fields, with lovely soft decks too for combat! Just about every member turned up at Northampton M.A.C.'s field for an inter-club comp., which they won. Any club interested in an inter-club comp.?

HATFIELD M.A.C. combat cup is being hotly contested for, the current holder is G. Wadds with his Silver Arrow powered *Peacemaker*. This is a popular combat model, numbering 12 in this club. The R/C element is flourishing, K. Waring's *Taplin Twin Junior* 60 with rudder and engine control is proving very reliable. The latest scare was when Martin Seib's 10-foot, 8-channel monster did a bunt down to ground level, all through Martin holding the control box the wrong way round and inadvertantly selecting down elevator for rudder, amongst the battery of switches. The model was not badly damaged, and naturally enough the control box is now being modified to a one-way only shape!

East Anglia

The F.A.S.T.E. Club combat crew has done well again by gaining first place in "A", and 1st and 2nd places in "B" combat at the recent Dagenham Rally, and blunting a few Razorblades in the course of the proceedings. They were unable to get an entry for their fastest "A" combat model, flown by Hank Nixon, but whilst in practice it was clocked by some bystanders, who commented "It's doing 110!" At the speed trials, top time in the bad weather was 147 m.p.h. by Gus Johnson's ETA 29 job.

Sun, wind, rain, hail and snow was the weather that greeted the **DEBDENAIRES M.F.C.** when they arrived at R.A.F. Debden for the area combat session. Standing around in that weather all day would make anyone lose heart, but as the saying goes, "He who laughs last, laughs longest," for Doug. Galpin had the last laugh, winning with his Enya 19 powered *Junior Flitestreak* using borrowed crew, borrowed accumulator, borrowed lines and a borrowed glow-plug. But he did build the model himself!

Easter was the date set for the first **ANGLIA M.F.C.** Club competition of the year. In F/F T. Davies really went to town winning both glider and power competitions. R. Bennett must surely be the luckiest member in the club, for at the K.M.A.A. cup held at Debden, he scored two max's. but lost two of his models in the process; however, both were returned as he left the 'drome.

South Eastern

As a result of the two A/2 Eliminators, the top three placings in the South Eastern Area are held by **BRIGHTON D.M.A.C.** members as follows: 1. J. West (total) 22.43; 2. F. Boxall (total) 22.27; 3. D. Latter (total) 20.38. In the second Eliminator at West Malling, F. Boxall's total of 12.54 was the highest A/2 time ever achieved in an Area Eliminator. In the first Wakefield Eliminator Dennis Latter was the only person to fly with a total of 7.13 and in the first Power Eliminator the top two places in the Area were held by J. West—11.47 and Ian Lucas—11.22.

At the recent South Eastern Area meeting held at West Malling, **SEVENOAKS M.A.C.** ran F.A.I. team racing which was eventually won by C. Weller of Ashford. Their own Alan Pennel won the ½A team race with a fifty lap A.M.15 model.

The *R.A.F.A. Shield Competition* has been enlarged this year and seven clubs in the area turned up at West Malling for the first round on April 9th. Despite good weather, times were not high. Top scorers were Glider—M. Smith (E. Grin.) 7 : 49; Rubber—A. Paige (Tun. Wells) 6 : 24; Power—P. Cameron (Crawley) 6 : 52. Top Clubs were Tunbridge Wells, 60 pts.; Medway 20 pts.; Crawley 20 pts.

Midland

Several of the members of 126 Sqd. A.T.C. at Alvaston, Derby, formed a model aircraft club. The Squadron warrant officer has been evicted and his office is now the club-room, with the promise of more space from the C.O. Anyone interested in joining, should write to the Secretary, Cadt. Langstaff, Stainton House, Broadway, Duffield. As Squadron property is used, it is a rule that new members should also join the squadron if possible.

Club champion of **SUTTON COLDFIELD R/C M.A.C.**, and this year's winner of the George Hales Trophy is Stan Robinson. Ian Cooke is runner-up, and had he been just that little bit more consistent—who knows? Robinson received his cup and miniature from Mrs. C. S. Rushbrooke, who, with Rushy, was a principal guest at the annual dinner and dance held recently. Appropriately, the venue for the year's dinner was "La Reserve", a spicy little restaurant inside Sutton Park, not far from the grassy uplands where the club was born.

WALSALL M.A.C. member Cliff Petty, Club Treasurer, came first in the "White" Trophy, flying a *Hustler* powered by a tuned Holland Hornet. At the moment his engine collection contains 87 different types (*Mmmmmm*!) Despite four entries in combat at Wellesbourne on April 9th, none reached the third round. Freeflighters suffered a similar fate. (Ouch!)

GEE DEE M.A.C. have been asked to put on three displays of model flying this year at Brackenhurst College for the Young Farmers' Fete and Gala, June 3rd, for a local Boy Scout troop who are interested in Aeromodelling, June 10, and for the British Legion Fete and Gala Ratcliff-on-Trent August bank holiday Monday, combat is in the programme. They've also been enjoying talks by the City Fire Prevention Officer and the Royal Navy and Royal Marine Recruiting office, with films.

At Wellesbourne on March 19th **KIDDERMINSTER D.M.A.C.** placed third thanks to P. Tanser. This has provided a source of much encouragement. On April 9th the club had its second Wellesbourne comp. This time, junior P. Jeffs using Rivers 2.5's, joined Mowbray, now using ETA 15 D's, and Tanser with Oliver Tigers. All were using Tanser's redesigned *Black Ghost* model which the club is calling *ZEX*. P. Tanser eventually won this comp. a very commendable effort, to which he himself attributed much credit to the efficiency of his pit crew. I. Kirshaw and H. Lamour.

Southern

The long awaited first flight of the **EAST GRINSTEAD M.F.C.'s** A.P.S. *Leprechaun* occured on March 19th. Unfortunately, just as all was ready a big black cloud came over and a panicky, desperate attempt was made, in which it got airborne, the radio stopped working and it crashed and everyone ran for shelter—all in a space of two or three minutes. But the prang of the year (*so far*) was by Geoff Kemp's 8-channel de-Bolt *Crusader*. He tried to pull it out from inverted too low, and it went in, full speed, vertically. It took fifteen minutes to dig it out of the ground. The hole it made in the hard, dry clay was nine inches deep. The propeller, 11 x 6 Top Flite nylon was folded back like a Wakefield folder, but unbroken. And when it came to counting the damage, only the engine was broken out and slightly damaged and the rudder and its servo had come out.

On Sunday, April 16th, **WINCHESTER M.A.S.** held a combat competition with eight entries. Winner of the ½A Class was A. Wright, a very promising Junior member, the Winner of Class "A" was D. Price, the Comp. Secretary, who was flying a *Dongus*. Club membership has now increased to 17.

Northern

Interest in Aeromodelling is increasing in **YORK M.A.S.**, junior P. Kazer coming second in the Northern Area when flying his *Sans Egal* in the K.M.A.A. cup. Juniors have been encouraged by combat and T/R competitions. The winner of the T/R I. Lingard, had to complete the final in the dark, although neither he nor the judges could see the model, landings being indicated by a shower of sparks. The prize was a 3.5 c.c. diesel.

A Rat Race (no connection with the aforementioned!) was held in April for the members, the only rule being that a tank no bigger than 30 c.c. was used, thus giving an equal chance for all types of engines. There appears to be some confusion between the **HUDDERSFIELD D.M.A.C.** and the **H.M.F.C.I.** There are now two Model Aero Clubs in Huddersfield. The first mentioned, which has been established for over 20 years and, of course, affiliated to S.M.A.E., and the latter is a new club formed in the last year.

OLDHAM M.A.C. is still turning out good attendances at the flying field every Sunday, J. Mellor's *Junior* 60 with radio, had quite an adventure. After climbing out of control into the blue (with owner trying to follow it on a motor cycle), it finally came down in water a couple of miles away.

Several new models have appeared recently in **HALIFAX M.A.C.** including a semi-scale *Curtiss Kittyhawk P-40 N* for combat, that really will go "square" powered by a Frog 249 B.B. Other models include a *Fokker Triplane* for C/L powered by a Merco 35 and is scale, down to actually spraying castor oil out of the cowling! Members who were the guests of Huddersfield M.A.C. on a trip to Clifton recently, would like to express thanks for a very enjoyable outing.

BAILDON M.F.C. members hoping for better weather for the second glider eliminators on April 9th, were sadly disillusioned, again they had strong winds and steady rain later in the day, which really cut down flight times. Gerry Tideswell topped their results for the S.M.A.E. Cup with 11 : 29. A junior, Mike Proctor, managed a creditable 9 : 03 after recovering his model from a factory roof, and M. Gilbert, a new member, with his fourth ever model, made nice flights to total 6 : 41 in conditions which deterred even the experts.

Control line interest is on the increase in **ROTHERHAM D.M.F.C.**, but the Club's first success of the season was gained in Free Flight when Ken Taylor won area open power at Clifton on March 19th. Ken's time was 7 min. 8 sec. with his *Dixielander* and tuned ED 2.46, not bad considering the gale force wind and assault-course field.

The various clubs in **SHEFFIELD** district are holding a Whit. week Model Exhibition, at St. Mary's Church, Bramhall Lane, Sheffield, opening at 2 p.m. Wednesday, May 24th and closing 9 p.m. Saturday, 27th.

WHARFEDALE M.A.C. extend a cordial invitation to all on June 4th at R.A.F. Rufforth, Nr. York, for their C/L Rally (Wetherby—York Road B1224). Events include ½A, F.A.I. 6 B, Team Racing, Combat and Stunt, all run strictly to S.M.A.E. rules. Stunt will be judged by Australian International team member Brian Horrocks and S.M.A.E. Technical Sec., Mr. B. A. (Sam) Messom. Pre-entry is requested and should be sent to L. Davy, "Sunnyside", Burley-in-Wharfedale, Nr. Ilkley, Yorks (2s. 6d. per entry—double on the day). They hear that the Northern Gala this year will definitely have C/L Stunt and Speed events added to the already impressive array of T/R competitions—thanks to the S.M.A.E. council and a very understanding Northern Area Committee.

Western

At the second Area Rally on April 9th, **GLEVUM M.A.C.** managed to take the first three places in Open Glider, Derek Harper beating Stan Perry in the fly-off with Charles Aitkenhead in third place. The latter also took second place in Open Power. April 8th saw the first stage of the "One Model" contest. Nine brand new *La Mouettes* were lined up for judging. Five of these being Junior entries. On the whole, the models were to a very good standard, the junior entries being particularly creditable. Top junior was Brian Perry, 2nd Dave Perry, 3rd Dave Green, whilst top senior was Elton Drew, 2nd Dennis Rattle and 3rd Stan Perry. D. Whitehead of Fletcher's Model Dept. has generously donated a handsome trophy for the top junior.

East Midland

PETERBOROUGH M.F.C. recently acted as host to members of the Leicester club for a spot of combat, from which Leicester emerged victorious. Afterwards, Peterborough settled the score by winning a friendly "time killing" match, thus ending a most enjoyable day's flying. Most of the members are pretty busy right at the moment, owing to an approaching display, and then the Nationals.

South Western

The now active **PLYMOUTH M.F.C.** held its opening meeting on March 31st at Lee Moor, with all classes of models (including radio control and control line), in a scaled time contest. There were over a dozen entries of varying types, from a scale free-flight *Luton Minor* to a small control liner flown by a youngster. About 40-50 spectators were also present, without doubt they had a very entertaining afternoon, as did all aeromodellers.

Scotland

MONTROSE M.A.C. have succeeded in consolidating their sudden increase in numbers which took place when the local "bulge" started aeromodelling this time last year. This means that if they count the juniors of the old "hard core", who have recently become seniors, they actually have half-a-dozen seniors building and flying F/F and so many juniors the same, three of whom are well past the beginner stage and building A/1 and A/2 gliders. Member G. R. Wheeler, who is a boy entrant in R.A.F. on Easter leave, broke all local glider records on April 7th, when two big springtime morning thermals kept his A.P.S. *Topscore* flying for 49 minutes, no D.T. because of calm weather and model was over the sea twice and up among the clouds before it landed less than a mile from launching point—another free-flight "convert".

Ireland

A model flying club has been formed in Newtownards under the name of **TOWNARDS AND D.M.A.C.** They held their first meeting on Friday, March 31st, with eight founder members in attendance. They have been fortunate in obtaining the use of a hall adjacent to Ards Airport (now disused) and it is hoped that official permission will be given to use the airfield. Main interest is in control line with combat, stunt and team racing to the fore.

Five members of **BELFAST M.F.C.** travelled to Newgrove House near Dublin to fly in the North Dublin M.A.C.'s combat and stunt comps. on March 26th. Weather was very windy, with the result that stunt standard was poor, and the combat really weeded out the rough weather fliers. David Black of Belfast won both comps., using his Oliver powered *Peacemaker*. Wilson was second in stunt and T. Stewart of Dublin second in combat.

See you at the Nats.!

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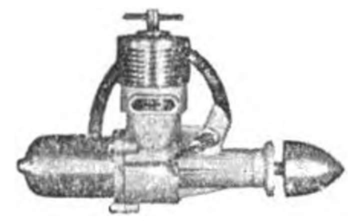

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