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APRIL 1955

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http://www.rcgroups.com/forums/member.php?u=107085

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AeroFred Gallery Free Plans.

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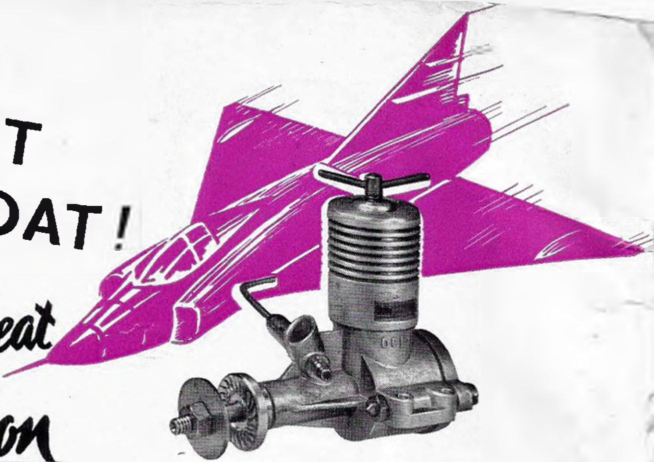

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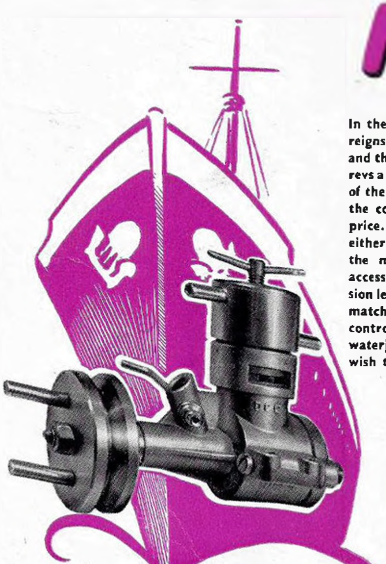

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Allen-Mercury 25 ...	57/-+ 9/6
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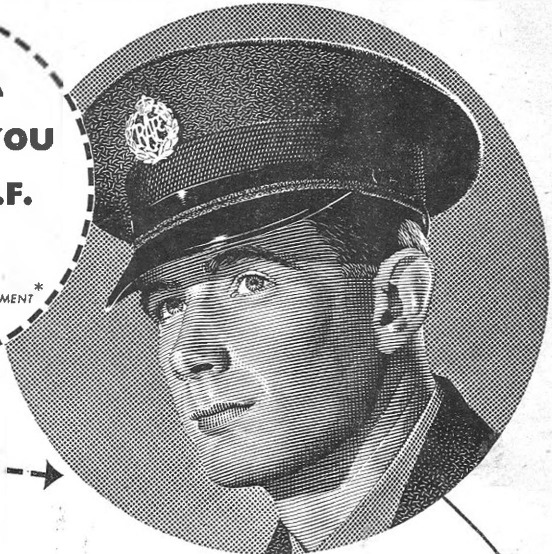

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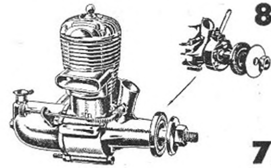

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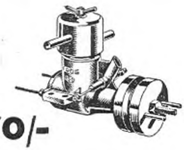

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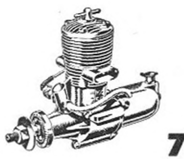
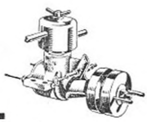


75/-



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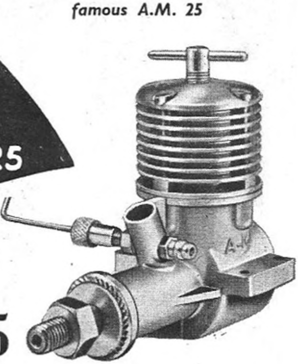

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"Covers the world of Aeromodelling"

VOLUME XX
NUMBER 231
APRIL 1955

Managing Editor - - - C. S. RUSHBROOKE
Editor - - - - - H. G. HUNDLEBY
Assistant Editor - - - - R. G. MOULTON

★

In this issue

Special features

★

Regular features

★

AEROMODELLER Incorporates the MODEL AEROPLANE CONSTRUCTOR and is published Monthly on the 15th of the previous month by the Proprietors:

MODEL AERONAUTICAL PRESS LIMITED
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Editorial and Advertisement Offices:
38 CLARENDON ROAD, WATFORD, HERTS
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FEDERATION ASSISTANCE

THE SERIOUS shortage of flying grounds at the disposal of aeromodellers is causing grave concern to all sections dealing with the hobby, and we welcome a recent decision by the Federation of Model Aeronautical Manufacturers and Wholesalers to tackle this situation with the utmost expediency.

A committee has been established to investigate the whole situation, and it is hoped to be able to assist modellers in all parts of the country in their efforts to obtain reasonable facilities for the following of their chosen hobby. One suggestion that may bear fruit is the provision of legal assistance to any group that is fighting the imposition of local byelaws, for it is obviously better to have a knowledgeable solicitor on hand who is au fait with the requirements, than to have to brief afresh on each and every occasion.

We know from past experience how easy it is for a club to have flying grounds denied them, in many cases owing to the youth and inexperience of club officials, who feel (and often are) at a disadvantage when dealing with adult councillors. It is high time that the hobby of aeromodelling was more generally recognised as having an equal standing with the better known sports of football and cricket, and to have at least a reasonable share of the facilities enjoyed by the more widely known hobbies.

This magazine has always advocated a forthright policy when dealing with the imposition of restrictive practices, and the support of the powerful trade federation is especially welcome at this stage in the long fight against ill-informed officialdom.

The formation of the F.M.A.M.W. was a milestone in the history of organised aeromodelling in the British Isles, and though by no means conducted as a monopoly, the group has been able to bring about many improvements in the model trade by co-operative action. The well-known fight against Purchase Tax ended in defeat, but served to prove that much good can come of combined action, with mutual benefit as the result. In consequence, the average aeromodeller benefits through the co-operation of those who cater to his needs, for today the supply market is right on its toes in an effort to provide the best materials and service to the great sport and hobby of aeromodelling.

On the Cover

Breaking our run of full-size aircraft on the cover is this frontal aspect of Pete Holland's attractive Biplane. Once in a while designs will crop up that provide a "new look", and fly like a dream no matter what the weather or the power output of the engine. Bi-Play is one of these, and we are certain that it will become a firm favourite of those who like to fly for fun.

Heard at the Hangar Doors

Three-Fold World Championships

Further to our March Editorial, where we criticised the insistence of staging separate World Championships meetings, word has reached us from Hans Justus Meier of the German model committee (M.F.K.) which clears the air considerably.

Meier states that when he attended the F.A.I. meeting in Paris he was duty bound to put forward the application on behalf of Germany, his committee not being aware that the U.S.A. was to propose a combined meeting. Under the circumstances, he was unable to accept the American offer, but at a later meeting of the M.F.K. on January 2, the situation was reconsidered, and the Glider Championship will now definitely take place at the same period as the Wakefield and Power events.

All that remains is for the A.M.A. to clear top level arrangements with their Air Force officials, when more detailed information will be forthcoming regarding venue, etc. This first three-event Championships should be the biggest thing to hit aeromodelling and we look forward to a fine meeting with every confidence. To our German contemporaries we send congratulations on so swiftly adopting the American offer, and trust it will not be long before we see the full "Olympics" in operation.

Contest Chatter

The two Radio Control events ("AEROMODELLER" and Ripmax) scheduled for May 8 will be taken as eliminators to select a team to go to the International r/c meeting, Cologne, for the King of the Belgians Cup two weeks later on May 21. Hopefuls had better apply for passports before these eliminators!

Big changes in dates—at the end of the season—occasioned by the Farnborough Air Display. This shifts the P.A.A. Scottish Festival of Model Aviation one week back to September 17 and 18. This date is final! Special train with excursion fare starting at London and calling at eleven principal stations en route to Scotland, should make the trip an enjoyable jamboree for Sassenachs. Actual venue appears to be in doubt, but will be announced in good time.

This in turn means a change of date for the previously scheduled 1956 Elim. for Wakefield and the team glider to October 9 (Gutteridge and *Model Engineer*) and to October 16 for A/2 and Power Elims. (K. and M.A.A. and Halfax).

The All-Britain at Radlett is to be on September 25 and there are to be at least 19 events, with rule changes in Combat, Clipper Cargo and r/c. More than £100 cash, trophies and diplomas will, it is hoped, be distributed by Sir Frederick Handley Page to contest winners, principal events being as follows.:

Rubber/Glider/Power	6 prizes each Class
Seaplane Rubber/Power	4 " " "
Tailless Rubber/Glider/Power ...	3 " " "
Concours d'Elegance Scale/Non-Scale	4 " " "
Team Race A and B	4 " " "
Combat (S.M.A.E. Rules)	2 " " "
Clipper Cargo 1 c.c.	3 " " "
Radio-Control Single/Multi Channel	4 " " "
Spectator Event	numerous prizes.
Record Trials	prizes for record-breakers.

Biggest break with tradition in '55 will be the move of the Northern Heights Gala from Hawkers at Langley to the R.A.F. Station at Halton on June 26. One of the most picturesque situations in the country, Halton nestles under the shadow of the wooded Wendover slopes in the Chilterns and is a grass field of not too great proportions. Surrounding woods will doubtless call for short d/t's, but are no more hazardous than the hangars and factory buildings were at Langley. Restricted tarmac area means that the Team Races will be

What are they looking at? It could be Frank Bethwaite's latest radio model during its world record flight described on the opposite page. In point of fact they ARE watching a radio model. but one flying at last year's Nationals at Waterbeach. Reader, J. Jones, who sent "the bodies", says the model was flying at approximately 800 feet, hence the need to get down to it replaced by Combat: though we see no reason why the Class A racers should not be given a chance on a single circle as has been arranged at this site by the S. Midland Area at past rallies.

Note: Queen's Cup this year is for A/2 Gliders.

New G.P.O. Licence Conditions

We have received a copy of the new G.P.O. Model Control Licence, which contains amendments to that previously issued. The most important changes concern the section headed "Non-Interference and Frequency Control Measurement". The original paragraph stipulating that each licence holder should provide equipment capable of verifying frequency between the specified limits has been omitted. Also the paragraph which stated that the frequency must be checked at the commencement of the first transmission period of the day.

They are replaced by Para. 2, Sect. 3, which reads: "The frequency of the sending apparatus shall be verified at such times, and by measuring equipment of such accuracy, as may be necessary to ensure that the emissions are within the authorised frequency bands."

Our interpretation of the above is that the G.P.O., realising that frequency checking equipment as originally specified would cost several hundred pounds, have left it to the good sense of radio control enthusiasts to see that no interference is caused.

We sincerely hope that good sense will prevail, and that every radio flier will ensure that his equipment is on frequency.

A Model Control Licence costs £1 for a period of five years, and full details of licence conditions may be had on application to Radio and Accommodation Department, Headquarters Building, G.P.O., London, E.C.1.

Looping Nebula

Modeller J. S. Ritchie of the Timaru M.A.C., New Zealand, was out testing his A.P.S. Nebula glider on January 23 and as there seemed to be some thermal activity, was using the pop-up tail dethermaliser. On the second flight of the day, the Nebula was down to 50 feet when the d/t popped and due to too small a tail angle, it developed a violent stall. This became a loop, and after a second and third loop the model appeared to be holding altitude, even climbing whilst still looping and eventually ascending to about 200 ft. After 185 counted loops in the space of five minutes, it landed safely and without damage only 200 yards from the launching point.

The flight has been certified by club officials and rates as an unofficial World free-flight looping record.

Off to the New World

Yet another of Britain's top-line modellers joined the ranks of Canadian clubsters this month, when Dave Sugden, *ex* Loughboro' and St. Albans, sailed for A. V. Roe (Canada), Ltd., at Toronto. Dave's "Making your own Engine" series will continue in our columns, culminating in June with a complete description of his latest (and hottest) 2.5 c.c. diesel, which can be made by any enthusiast with lathe facilities.

It would appear that most of our modellers who also happen to be kingpins on aerodynamics in the aircraft industry, gravitate ultimately to the Canadian factories—let's hope that Hawkers and English Electric will be able to hold on to Bob Copland and John O'Donnell, or our future in the Wakefield may be jeopardised in favour of the strong Anglo-Canadian group!

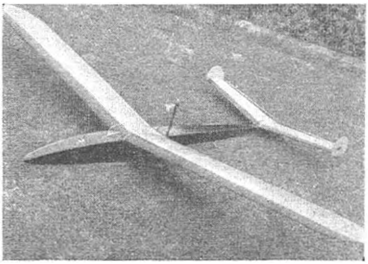
Radio Records Get Longer and Longer

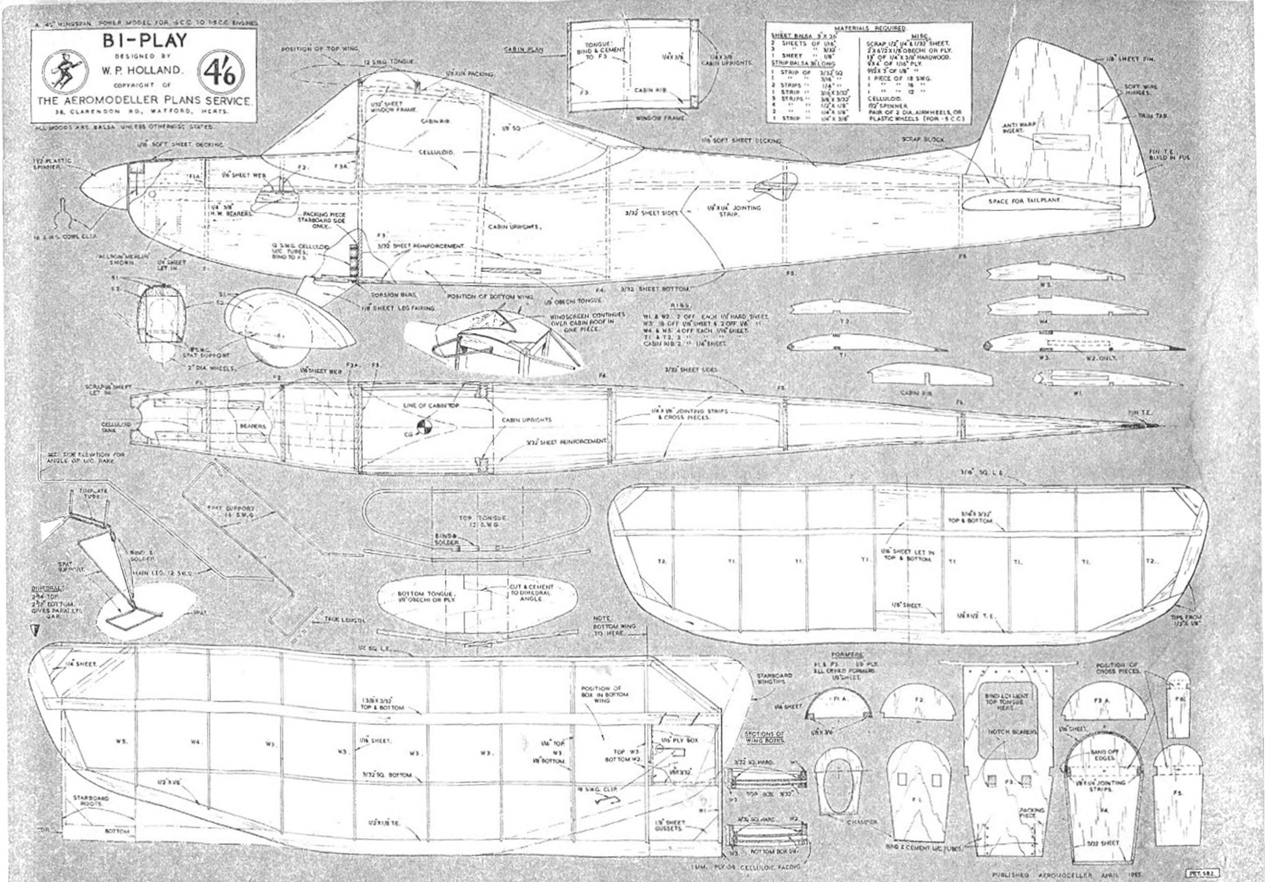
Following publication of the H.M.V. Radio Outfit in our last issue, we hear from Frank Bethwaite that, using this equipment, he has made a powered flight of 3 hrs. 2 min. 6 sec.

The model, as shown in the photograph, is virtually a powered glider with a Mills 1.3 c.c. diesel pylon mounted behind the wing. Particulars of the flight, which took place at Rukuhia near Hamilton on January 30, are as follows:—The model R.O.G'd. at 5 p.m., when a 10-knot breeze prevailed, and was flown most of the time at between 12-1500 feet. Flying was easy with elevator trim control, and two neutrals on the twin rudders; one set for straight flight, and the other a lazy circle. Failing daylight made landing imperative just after 8 p.m. and the model was landed under power only 40 feet from the transmitter.

This magnificent effort does credit to Frank Bethwaite, who by now must have the stiffest neck in New Zealand. It also reflects the qualities of the H.M.V. Outfit, which already holds the International Radio Control Glider Record, and now, subject to ratification by the F.A.I., will also be credited with the International Radio Control Power Duration Record.

In our last issue, when describing the equipment, we failed to give the resistance of the Relaytor windings, the figure being 3,000 ohms.




A 42" WINGSPAN POWER MODEL FOR ·5C.C. TO 1·5C.C. ENGINES
BI-PLAY
DESIGNED BY
W. P. HOLLAND.
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE.
38, CLARENDON RD., WATFORD, HERTS.
4/6
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED.
MATERIALS REQUIRED.
SHEET BALSA 3"X 36"
2 SHEETS OF 1/16"
3 " " 3/32"
1 SHEET " 1/8"
STRIP BALSA 36" LONG
1 STRIP OF 3/32" SQ.
1 " " 3/16" "
2 STRIPS " 1/4" "
1 STRIP " 3/16 X 3/32"
5 STRIPS " 3/8 X 3/32"
4 " " 1/2" X 1/8"
2 " " 1/4" X 1/8"
1 STRIP " 1/4" X 3/8"
MISC.
SCRAP 1/2", 1/4" & 1/32" SHEET.
2"X 6 1/2 X 1/8 OBECHI OR PLY.
13" OF 1/4" X 3/8" HARDWOOD.
9X4" OF 1/16" PLY.
9 1/2 X 3" OF 1/8" "
1 PIECE OF 18 S.W.G.
1 " " 16 "
1 " " 12 "
CELLULOID.
1 1/2" SPINNER.
PAIR OF 2 DIA. AIRWHEELS, OR PLASTIC WHEELS (FOR ·5 C.C.)
CABIN PLAN
TONGUE: BIND & CEMENT TO F3.
CABIN RIB.
WINDOW FRAME.
1/4 X 3/8 CABIN UPRIGHTS.
POSITION OF TOP WING.
12 S.W.G. TONGUE
1/8" SHEET FIN.
SOFT WIRE HINGES.
TRIM TAB.
ANTI WARP INSERT.
SCRAP BLOCK.
FIN T.E. BUILD IN FUS.
SPACE FOR TAILPLANE.
1/16" SOFT SHEET DECKING.
1 1/2" PLASTIC SPINNER.
CELLULOID.
CABIN UPRIGHTS.
3/32" SHEET SIDES.
1/8" X 1/4" JOINTING STRIP.
3/32 SHEET REINFORCEMENT.
TORSION BAR.
1/8" SHEET LEG FAIRING.
POSITION OF BOTTOM WING.
3/32 SHEET BOTTOM.
2" DIA. WHEELS.
WINDSCREEN CONTINUES OVER CABIN ROOF IN ONE PIECE.
RIBS.
W1. & W2. 2 OFF EACH 1/16" HARD SHEET.
W3. 18 OFF 1/16" SHEET & 2 OFF 1/8"
W4. & W5. 4 OFF EACH 1/16" SHEET.
CABIN RIB 2 " 1/4" SHEET.
CABIN RIB
LINE OF CABIN TOP.
BEARERS.
CELLULOID TANK.
1/4" X 1/8" JOINTING STRIPS & CROSS PIECES.
FIN T.E.
TOP TONGUE 12 S.W.G.
BIND & SOLDER.
BOTTOM TONGUE 1/8" OBECHI OR PLY.
CUT & CEMENT TO DIHEDRAL ANGLE.
SPAT SUPPORT 16 S.W.G.
MAIN LEG 12 S.W.G.
TEMPLATE TUBE.
SPAT.
TRUE LENGTH.
DIHEDRAL: 2 3/4" TOP 2 1/2" BOTTOM GIVES PARALLEL GAP.
3/16" SQ. L.E.
3/16 X 3/32 TOP & BOTTOM.
1/16" SHEET LET IN TOP & BOTTOM.
1/8" SHEET.
1/8 X 1/2 T.E.
TIPS FROM 1/2" X 1/8"
NOTE: BOTTOM WING TO HERE.
1/4 SHEET.
13/16 X 3/32 TOP & BOTTOM.
1/16" SHEET.
3/32 SQ. BOTTOM.
POSITION OF BOX IN BOTTOM WING.
1/16 PLY BOX.
18 S.W.G. CLIP.
1/8" SHEET GUSSETS.
1/2 X 1/8 T.E.
STARBOARD WINGTIPS.
STARBOARD ROOTS.
SECTIONS OF WING BOXES.
TOP BOX 3/32
BOTTOM BOX 1/8"
FORMERS.
F1 & F3 1/8 PLY. ALL OTHER FORMERS 1/8" SHEET.
NOTCH BEARERS.
PACKING PIECE.
BIND & CEMENT U/C TUBES.
POSITION OF CROSS PIECES.
SAND OFF EDGES.
3/32 SHEET
CHAMFER.
1 MM. PLY OR CELLULOID FACING.
PUBLISHED AEROMODELLER APRIL 1953.
PET. 582.

Pete Holland's

model on the cover — a new look in Biplanes for a wide range of ·5-1·5cc engines

Bi-play

WHY NOT a lightweight Bipe? The gap in our plans service range of sport designs was plainly obvious. We have the medium weights for all sizes of engine; but not a single one with large area for low power—and slow flight. Pete Holland set himself the task of filling the bill within a week and came through with this new approach with time to spare.

The result was born of a spot of stability research, and the desire to clean up orthodox slab side construction. With this in view, the following points were incorporated.

1. Large decalage and stagger.
2. Low C.L.A.
3. Knock-off wings with spring top tongue.
4. No elastic bands, struts, etc.
5. Streamline cabin.
6. Suitability for ·5 to 1·5 motors.

These ingredients proved to meet the case, result was a job which can be taken out of the box, given full throttle and hurled with complete abandon!

Cut out **fuselage** formers and sides. Make celluloid tubes to fit 12 S.W.G. u/c and bind to F.3, not forgetting the 3/32 in. ply packing piece on starboard side (this allows for wire thickness of torsion bar).

Drill bearers and bolt in motor, cement bearers to F.1 and F.3. The motor will then hold the assembly true. Now cement 1/8 in. × 1/4 in. jointing strips to fuselage sides and assemble sides, formers and bearer unit. Start at the tail with the fin t.e., between the fuselage sides, and work forwards. Add fuselage bottom and cross pieces. The 1/16 in. sheet top decking is wrapped over in one piece each, fore and aft, after making up the correct width using butt joints as necessary. Sand off the 1/16 in. projection of the sides at the joint so that the curve fairs in smoothly.

Complete by adding wing tongues, cabin uprights and cabin top.

Upper and lower wings are built from the same plan. Note that upper wing only has the extra root panel. Make both port halves on plan then remove and build starboard halves on their undersides.

Add boxes *between* ribs, using 3/32 in. sq. strip to reinforce joints. Face roots with thick celluloid or 1 mm. ply and trim to section profile. Cement 18 S.W.G. clips to boxes to locate tongues.

Fin is 1/8 in. sheet and is fixed between scrap blocks on fuselage, its t.e. is already in place and locates for verticallity.

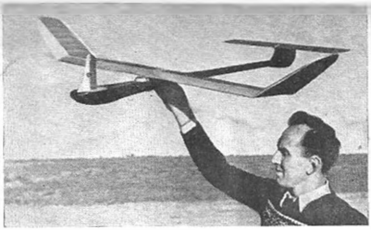
Make one pair; left and right handed of main u/c leg, and spat support. Bind and solder support to leg and assemble the legs so that the torsion bar of left leg is in front of the right leg bar, wrap tinplate round the torsion bars to form a tube and solder, leaving the bars free to rotate. See sketch. Spring end of spat support down and fit wheel(s) then bend back and solder to axle. Spats and fairings can be cemented in place.

For ·5 to 1 c.c.; lightweight Modelspan all over. Colour scheme can use different colour on l.e. jointed on the wide spars. For 1 to 1·5 c.c. heavy Modelspan and a more elaborate colour dope scheme.

The original is powered by a Merlin ·76 c.c. and though it required no trimming, further flights were made to ascertain the limit of trim. It was found that 3/16 in. rudder and 1/4 in. tailplane adjustment was possible before an excessive change of trim occurred. The normal flight pattern is left power and left or right glide to order. Though light, its excess stability takes care of turbulent conditions, so the resulting progression has no sharp edges.

A powerful ·5 c.c. diesel should cope, providing the total weight is not more than 18 oz. (the Merlin was O.K. down to half revs.). At the other end of the scale, an average 1·5 c.c. motor would produce a sprightly though not overpowered combination, when around the 20 oz. mark.

Full-size copies of the 1/4th scale plan reproduced opposite can be obtained price 4/6d. post free from the "AEROMODELLER PLANS SERVICE", 38 Clarendon Road, Watford, Herts.



Vane Steering

No batteries—No actuator. Just a simple bar magnet is all you need for a new thrill in slope-soaring or tow-line gliding. Two applications are described here by

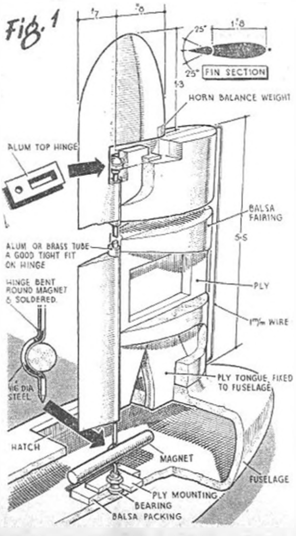
Hans Gremmer

SUCCESSFUL slope-soaring depends entirely on directional stability, and the use of a special course control is an absolute necessity to combat wind-drift and to achieve a straight flight path. The usual equipment applied on the continent for this purpose is compass-steering with batteries and an actuator. It must be confessed, however, that it makes slope-soaring much more complicated and also expensive in comparison with simple tow-line gliders.

Forward Rudder

This new control eliminates the batteries and all the electric rudder mechanism. Its principle is the immediate application of the compass-direction force of a very strong ALNICO-magnet. As shown by *Figs.* 1 and 2, rudder and compass are attached on the same axis. Should the model deviate from the predetermined course, the compass remains stationary in relation to direction and the rudder gets just that angular movement, which forces the model back to the original flight path. Alterations in direction can be achieved by slipping the rudder around its axis. The whole auto-pilot is fitted on the forward part of the fuselage serving a double purpose: control and balance-weight. The new mechanism is called "Vane steering" to avoid confusion with the conventional compass-steering.

Fig. 1



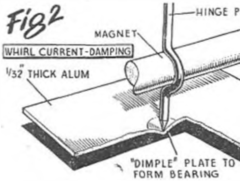
A great many model-builders originally expressed their doubts concerning the possibility of controlling a model aircraft in this way. However, Herr Gremmer was able to convince them with success, as the new steering helped him to win the traditional slope-contest on the world-famous Wasserkuppe/Rhon, held on Whit Monday, 1954. The model achieved a total time of 40 : 9 min. in four flights, every time landing near the launching ground. So he became "Rhonsieger 1954".

Theoretical details

An ALNICO-magnet is employed with a length of 3½ in. and a diameter of ·3 in. Its weight is 1 oz. and is able to lift a piece of iron of about 21 oz. which is much more than the model weight. After all, the direction-force is no more than ·005 oz. on the poles. Towards the axis, say at a distance of ¼ in., the force increases by the effect of the moment-arm to about ·04 oz.

Now let us look at the load which has to be exerted by the rudder. A force of ⅓ oz. is enough to cause a considerable change of direction. This pressure, however, is distributed over the total control area. Thus the movable rudder has to exert no more than $\frac{1}{35}$ oz. and the compensating surface

Fig 2



At far left, two versions, Windbird with forward fin and Aeolus with more conventional aft fin are held ready for launching by the author. Earlier articles in the German press by Herr Gremmer have resulted in others taking up this form of controlled flight, including Ulrich Stampa, a resident of Argentina. A pylon mounted engine above the wing has been used to take the model up to altitude on later version

must not be larger than one-fourth or one-fifth of the whole movable rudder area. Part of the load is applied to the fixed fin, and the rest is aerodynamically balanced, thus strengthening the compass-direction-force.

To get out the best of the steering a special rudder shape must be developed. A tall rudder with restricted movement proved to be better than a low, but broad one with the same area, as the power-arm of the magnet is more efficient in the first case. Considerable care was applied in finding the right proportions for the compensating surface, or "Horn". If this is too small, the compass-direction-force is insufficient for control. Too large, the rudder begins to swing and causes a terrible zig-zag course. The best proportions are shown by *Fig.* 1. Many attempts were also made to find out the best fin-section. A thick symmetrical airfoil with a wire turbulator produced better results than a thin airfoil with a pointed nose. The improvement was about 50 per cent.—a very astonishing effect.

Construction

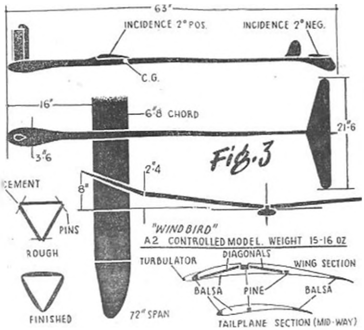
Anyone, provided they are able to bend a piece of steel wire accurately, can build this autopilot. As the magnet cannot be drilled you must bend the axis half round the magnet, as shown by *Fig.* 2. Heating the wire at this section will simplify matters. Then the points of the axis at the ends can be made by a file. The two bearings consist of simple iron or brass screws countersunk about 0·1 in. Jewel bearings are not necessary, because the ALNICO-magnet overcomes the light friction, which in any case is welcome to cause a damping effect on undesirable oscillations evoked by wind gusts.

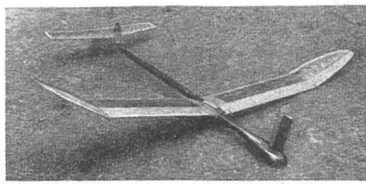
Special damping would be better for this purpose. A thin aluminium plate close under the magnet will do the trick. Magnetism of the compass creates whirl currents in the plate when swinging, and thus oscillations are stopped. However, this damping is not an absolute necessity. The winning model was built without it and experiments were made after the above-mentioned contest.

The forward part of the fuselage must be hollowed out and the shape of the model becomes a little unusual. A lengthy nose is also advantageous to guarantee a sufficient fin moment and to improve longitudinal-stability. A very suitable model type for this kind of autopilot would be a canard. A tailless model is not commendable for this new steering device!

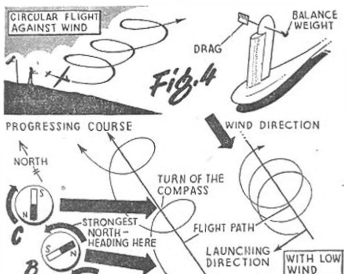
Applications

With a well-built steering unit one can enjoy delightful flights on slopes. The flight path oscillates less than with electrical steering, because the angular movement of the rudder is proportional to the rate of deviation. The latter, it should be unnecessary to say, must not be caused by warps on the model, but only by wind gusts.





Above are drawing and photo of Windbird. The flat club like nose is to accommodate the Alnico-magnet, the rest of the fuselage being much on the lines of Max Hacklinger's A/2, M.P.12, published in January, with triangular section joined at corners by a solid cement fillet



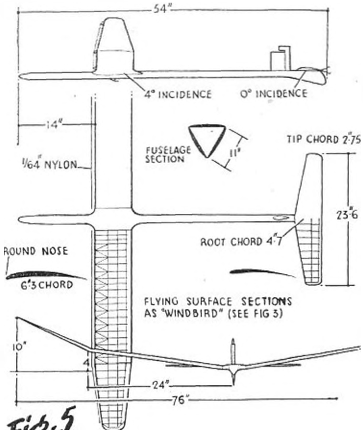


Fig. 5

Set the compass to a flight direction deviating 90 degrees from the wind-direction. Fit a thin tube with a piece of balsa on the moving rudder, serving as a little drag area. Then the airstream will press the rudder and effect the turn, which achieves a different shape (*Fig.* 4).

(*a*) After the launch, the compass direction force is not strong, as the deviation is slight. So the pressure of the drag-plate evokes a displacement of the rudder and a turn.

(*b*) In the middle, at a rotation of 90° the compass direction force has the greatest effect and dampens the pressure of the drag-plate. So the curve becomes smoother and the model soars a longer way into wind.

(*c*) After a rotation of 180° the compass slams over to the opposite direction, and the model turns fast downwind.

The best times reached in this way were 9 : 17 min. on the above-mentioned hill and 22 : 8 min. on the Wasserkuppe/Rhon. The wind must be rather regular, however. Further efforts might improve this technique of flying.

"AEOLUS"—with rearfin

Since 1953 Herr Gremmer has been experimenting with transmission of the compass-power by thin threads to an aft-fin (*Fig.* 5). The magnet itself is fitted in the centre section (*Figs.* 6 and 7). In the first trials there was no noticeable improvement. After some alterations results were most satisfying under all conditions, so that this new type seems to be a little superior to the earlier one.

Four main advantages are connected with this layout:

(1) The rudder-effect is greater, as the fin-moment is enlarged. Since the compass-arm now has a greater angular movement than the rudder-arm, the so-called "cosinus-effect" is applied. Assuming a displacement of 60°, the control-force is increased by $\frac{1}{\cos 60°} = \frac{1}{0.5} = 2x$. This enlarged power is being multiplied by the doubled arm of transmission, so that in this assumed case of deviation the rudder-force must be four times more than before.

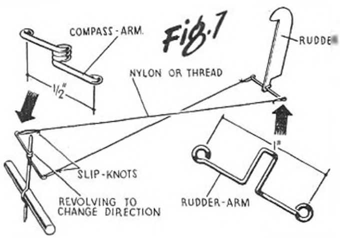


Fig. 7

Strong wind wanted!

High winds are welcomed to make the "Windbird" soar (*Fig.* 4) gaining both height and duration, always fighting against wind drift, whereas conventional models turn downwind within a short space of time. If the wind speed is greater than the model flying speed you have to launch further down the slope. The best time reached in this way so far is 9 : 35 min. on a hill only 120 ft. high.

Usually a model trimmed to fly straight ahead will cross the slope lift zone very quickly. But there is an application to keep the glider over the slope for a longer time in calm weather. You might reach this by a circular flight path *against* wind, so that the model makes a wide turn into wind and a narrow one downwind.

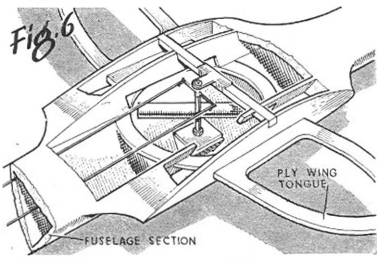


Fig. 6

(2) By omitting the "club" nose the model looks like a normal glider and the drag is reduced. Therefore the model can also be used as an A2 model for tow-launching.

(3) The improvement of dynamical longitudinal stability by lessening the moment of inertia is remarkable, as the forward part of the fuselage and the tail can be made very light.

(4) There is the possibility of flying "eights" in low wind by only changing the threads and by turning the compass 180° as shown by *Fig.* 8. Through the effect of the turning-point of the compass the model makes a curve until deviating 90° from the preset course. Then the magnet slams over to the other side and the model changes the course until deviating 90° again and so on. Naturally the turns could be made smoother according to the wind-speed by limitation of the angular movement. Regular wind and an additional forward compensating surface for greater inherent directional stability will be required for this technique of flying.

There are also some disadvantages.

The circular flight path does not succeed as well in duration as with the forward fin type, which might be compensated by flying "eights". There is also another very safe method to lengthen the duration of flight in low wind, using a simple mechanism as shown by *Fig.* 9.

Another disadvantage of "Aeolus" is the fact of being more complicated than the forward fin type. Therefore it requires more care and skill.

The transmission by threads, too, sometimes causes trouble. In the original thin Nylon-threads ·004 in. were used, but they were sensitive to temperature. After a year of experiments Herr Gremmer succeeded in finding simple sewing-thread a more satisfying material. It is hardly sensitive to temperature and it is possible to adjust alterations of the length by knotting and shifting bows. *See Fig.* 7.

Apart from these little difficulties it may be said that a straight flight path is very easily achieved by this autopilot. Best time reached by "Aeolus" was 16 : 34 min. on the little hill of only 120 ft. The model climbed 150 ft. above the launching spot and landed only half a mile away. Perhaps the "Windbird" under the same wind-conditions might have flown a similar time.

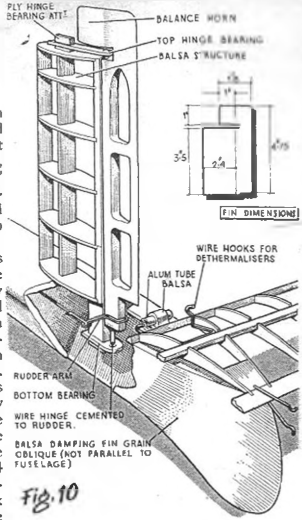


Fig. 10

If you desire a simple model and the circular flight path into wind, the "Windbird" may be recommended to all newcomers to this steering.

Concluding this article, it may be said that for many reasons controlled slope-soaring with wind is more advantageous than tow-launch flying. The model does not fly far away and you are able to watch it all the time. During the flight of 16 : 34 min. Herr Gremmer had to walk only half a mile at the same time enjoying the wonderful soaring of "Aeolus", whereas a tow-line glider with the same wind-speed of about 10 m.p.h. flies at least 5-6 miles, so that you have to run continuously after the model and to spend nearly a whole afternoon to bring it back to the flying field. With low wind you might chance the method of flying by interrupting the straight course, by "eights" or the circular flight path into wind and so on.

Thus slope-soaring is more thrilling, pleasant and interesting for spectators and for yourself. Slope-contests give more satisfaction to serious model-designers, as the steady lift guarantees rather equal conditions for all contestants and soaring corresponds more to the ability and skill of man. If you have a hill, all you need is a good strong wind and you are set for flying when many a tow-liner is grounded for the day.

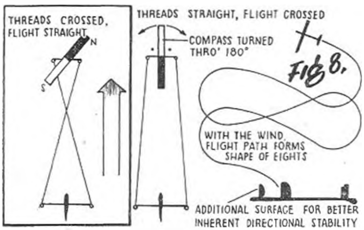


Fig. 8.

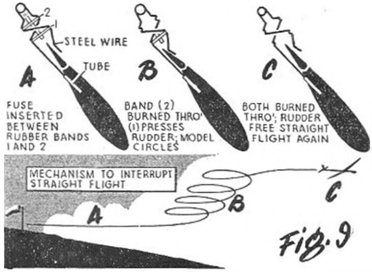
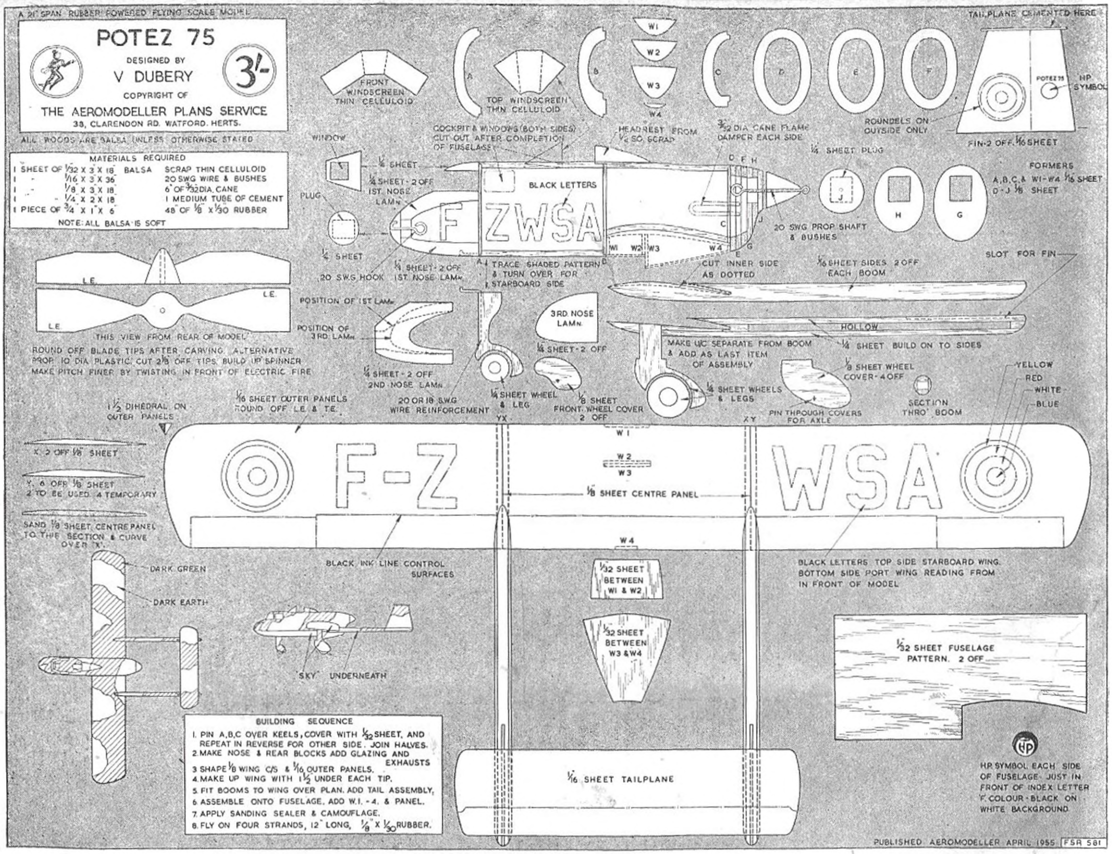
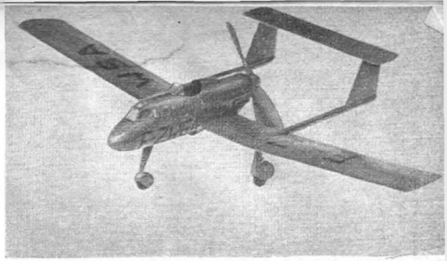


Fig. 9



Full-size copies of this 1/3rd scale reproduction of the A.P.S. drawing can be obtained, price 3/- post free from the "AEROMODELLER PLANS SERVICE"



ALL SHEET SCALE RUBBER

POTEZ 75

By Vic Dubery

HERE IS A model which, though not exactly for beginners, is about the easiest to build scale model we can devise. For a modeller with a little experience it is also easy to finish well. Sorry we can't pre-fab it for you, but we have avoided tissue covering and have worked out all the patterns. Use the lightest, softest balsa you can get for best flying results but don't worry, it has bags of oomph and can carry extra weight. The scale, except for the prop., is 1/24th as near as published information will allow.

Fuselage. Cut out formers A, B and C. Trace fuselage view of shaded longerons and formers and turn over so that you can then make two halves. Pin down ⅛ in. × 1/16 in. strips (shaded) and add formers. Cut out two fuselage side patterns from light *pliable* 1/32 in. balsa. Cement top edge to top longeron of each half frame and allow to dry. Slightly dampen outside. Wait for two minutes. Check that pattern fits properly when pulled down over formers. Smear edge of formers and bottom straight longeron with cement. Curve the sheet gently down over the frame making sure full contact is made.

Make two half nose pieces, nose plug with hook and cabin top from ¼ in. sheet. Cut out and cement together ⅛ in. sheet rear fuselage formers D-I. Remove two half frames from plan and cement together, add rear and front units and carve to shape. Cut out window and cockpit (gently does it here!). Add front and top windscreen and windows (thin celluloid), headrest and exhaust system.

Wings. Cut out ⅛ in. sheet centre section and sand to shape shown. Make two ⅛ in. ribs and put in place on plan. Mould with fingers to give undercamber and curve section to fit over these. (If wood is not soft enough, dampen top and dope underneath lightly.) Smear cement over tops of ribs and pin down centre section on to them.

Make two 1/32 in. sheet outer panels and six ⅛ in. ribs "Y". Mould panels (or wet-and-dope) to get undercamber. Cement for each panel one rib Y to inner edge. (Be sure to make left and right panels.) Pin down on plan using the remaining four ribs as shapers only, not cemented, located near tip and half-way.

When dry, unpin, discard dummy ribs and prop up outer panels with 1½ in. blocks at tip, root ribs on edge of table. Bring each outer panel up to centre section, checking that they match correctly, again with 1½ in. blocks at the tips. If satisfied, cement in place.

Cut out shapes for **tailplane, fins** and two sets of boom parts. For booms, cement ⅛ in. sheet pieces to inner one of the 1/16 in. sheet sides, making sure you get left and right booms, then add the outer 1/16 in. sheet side. Sand to oval cross-section and groove as shown at rear for a good fin seating. When both booms are complete, remove wing from plan, and apply sanding sealer to all parts. Do not attempt to fill in the grain to absolute smoothness.

Now pin booms in place on the plan. Slot wing in to check fit, trimming the boom slot as necessary.

Apply cement to all contacting surfaces and push into place. This gives the correct incidence. Add fins, cementing well. Use a set square to ensure that they are vertical when viewed from the rear and check that top edges are parallel to the building board. When correct add tailplane on top. Care here gives you a model that flies "straight off the drawing board."

Next cut out and cement together undercarriage parts including 18 s.w.g. wire to reinforce the front leg. Parts should be rounded off, and legs should be of oval cross-section except where they plug into the booms. Remove the wing and boom structure from the plan and check that fuselage fits over centre section. Cement in place and then fit W1 to 41 and add panel.

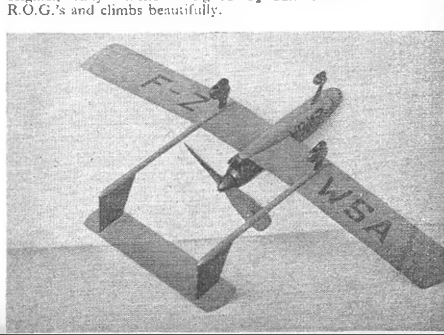
Cement undercarriage in position, checking for true tracking.

Propellor. This one is *really* a propellor. Carve using, blank shape shown, or use a Keilkraft 7¼" plastic with ⅜ in. cut off each tip and added spinner. In the latter case winding up will have to be in reverse, and be sure the prop. faces surfaces forward. Remember performance depends more on a good propellor than anything else. Bush nose block and also prop. if you fit a free wheel, which can be a simple loop on the shaft and swinging pin on the prop.

Prepare a 12 in. 4-strand motor from ⅛ in. × 1/30 in. rubber and tension by roping 60 turns on each half. With the carved prop. just do this by winding from the front in the normal direction; reverse the direction for the plastic prop. For more power, two strands of ¼ in. × 1/24 in. "Wakefield" rubber could be used.

Testing. Balance by pushing slivers of lead into the nose plug from the inside until the model just balances on the rear wheels. Test for glide adding more weight if necessary. To the propeller plug add 1/32 in. underneath for "upthrust". Also 1/32 in. to the left (carved prop.), right (plastic prop.). Give a few hand turns, gradually increasing and making very minute thrust adjustments with pieces of paper until the power flight is satisfactory. The best way to fly a low wing model with high C.L.A. is "*straight-straight*". Remember "upthrust" cures a power stall.

The solitary full-size machine has brown and green camouflage on upper surfaces and "duck egg" undersurfaces. If your model weighs around 1¼ ounces or less, you can give it the full treatment without detriment to its flying. If it turns out heavy either be content with lettering and roundels. It started life in natural metal finish so a light aluminium coat would be alright. The original, fully finished weighed 1⅛ ounces and it R.O.G.'s and climbs beautifully.



Readers Letters . . .

A View on Averages

DEAR SIR,

The 1954 Contest Average Tables as published in the January, 1955 "AEROMODELLER", while quite interesting in many ways, do not however give a true picture of the comparative merits of the individual competitors. It is hardly fair to compare competitors who have only taken part in three or four contests with those who have entered all seven. Those who only entered a few may have missed the other contests among other reasons, because the weather was unfavourable and therefore their flight average would naturally be higher than those who entered every contest. A fairer system would be to take say the four best sets of times, then all would be on the same footing. Most of those shown on the tables took part in at least four contests.

I think this would probably show some alteration in placing in both the Power and Glider tables, as in these only two competitors took part in all seven contests. Silvio Lanfranchi in the Power and John O'Donnell in the Glider. It would be interesting to see how they would be placed if their four *best* contests, only, were noted.

In the Rubber table, John O'Donnell was the only one to compete in all seven contests, even so, he is at the top, but possibly John's average in his four best contests would no doubt place him still further ahead of the second man.

In their present form the Average Tables are not quite true and I hope these observations may help to clarify the matter.

Liverpool. R. F. L. Gosling.

. . . and on Radio Control

DEAR SIR,

In an excellently run and interesting day last year at Radlett the wind was rough on models, but the display of Radio Control let the side right down, and worst of all, in full view of the News cameras and general public.

This is not the way to get the publicity we want.

Now let's offer some helpful criticism: Your motors are good, your r/c equipment functions when care is taken in the general set-up, but your kites reminded us of spruce and silk rubber jobs of around 1930.

You r/c boys are still thinking in terms of paper bags, light loading, huge wings that are buffeted about by any gust that blows. We did all this thirty years ago. Now you have power, use it to advantage.

Push your wing loading up to 18 and 20 or more ozs. per sq. foot—give yourselves penetration. Reduce your span, you know what the English weather is like so build accordingly. Why have three rubber balls dangling beneath your fuselage for an u/c giving enormous drag?

These wheels are so bunched together and the wire so springy that they don't give you a true track for take-off and on landing this so-called u/c only gives you a ground loop.

When the weather is rough you have to hand launch, so why have this abortion of an u/c. Take a lesson from the C/L speed merchants, even the Dynajet boys, when their motors cut they come in on a nice flat glide—they're controlled—so are yours.

Why not use a dolly for take off and slide in on an even keel? Of course, you'll be faster, you want to be. You can cut a swathe through long grass at 25 m.p.h. with far less damage to your r/c equipment than ground loops and bumpy landings.

Build a keel to your aircraft like a flying boat and slide in on tarmac—it works. You can afford a metal strip on your keel as your wing loading is going up, but hardwood stands up quite well.

Build your planes strong and parts knock-off-able. Don't be scared of speed; it's your salvation and will pay handsome dividends. Get out of the 1930 era and get some mid-century ideas with an eye to the future.

Eastbourne. H. J. TOWNER.

. . . as it should be done ?

DEAR SIR,

One recent Sunday we joined a number of friends in picnic atmosphere at Camden aerodrome, close to Sydney. The object was a good day out, without formal competition and I heartily recommend this freelance spirit to all interested in radio control.

An unusually strong westerly wind confined interests to the picnic side of the programme until about 4 p.m. when the wind abated.

The local boys—Gil Miles, Jack Dunkerton and Wal Marsden—all flew models with a fair deal of success, but we have no hesitation in bowing our heads to a New Zealand visitor—Frank Bethwaite—who absolutely turned on the most remarkable display ever witnessed in this country. After watching his world record model sailplane (this model has recorded 2 hours under radio control) Frank produced a powered model that fairly tore the place apart. Not only did he perform every stunt in the book, but left us "Aussies" gasping at his remarkable control, when he repeatedly spiralled his model from 500 ft., then calmly pulled out in flat flight a mere 15 ft. above our heads. Frank certainly can handle a model (*the R6-B published last month*) and his H.M.V. gear never seems to fail him.

We are proud of our "flying" in Australia, but "dip our lids" to a champion from New Zealand.

Rockdale, New South Wales. F. MURRELL.

Veteran R/C

DEAR SIR,

On page 607 of your November issue there is a reference to a radio-controlled Airship.

I saw Mr. Willows demonstrate his "dirigirible" in Dundee in 1912 (not the 1920's, when valves were in general use, and coherers were outdated). I met Mr. Willows, and talked to him of his model, which was shaped on the lines of a Zeppelin, about fifteen feet long, and two feet six in diameter.

It was very controllable, and, as the note says, used a coherer for reception. This actuated a relay, which rotated a drum by a ratchet. This drum carried various contacts, and each position brought different navigating arrangements into operation. There were airscrews for propulsion, and others on vertical spindles for altering height. The "bomb doors" could be made to open, and to drop flowers, usually made of paper, on the audience.

Mr. Willows told me that, when demonstrating the model in theatres, his greatest difficulty was to adjust its flight to the differences of temperature between the stage and the auditorium, especially the current of hot air rising from the footlights.

The demonstrations I saw were entirely successful and he also lighted up a small Christmas tree by remote control. The audiences thought it all really magical!

May I congratulate you on producing such a very interesting journal.

Yours sincerely,

London, W.1. DR. W. MOODIE.

It's the same the whole world over

Dear Sir,

We here in North Malaya (Penang, P.W. and Ipoh) always look forward to the end of the month when we get our copies of the "AEROMODELLER". We have the "AEROMODELLER" as one of the few ways we can keep touch with the modelling world . . . modelling here in Malaya is very much like that in England. When flying, soothing phrases like "Keep your ruddy fingers away from that wing you ——" are often heard. We, too, frown upon dogs, doting parents and noisome little children. We also have the odd bod who insists on doing wingovers with his class A T/R . . .

Yours faithfully,

Kepala Batas, MALAYA. HORACE MEHTA.

One of many letters of similar vein received from all parts of the world. If out-of-touch modellers in remote parts have any special requests for article subjects, we would be pleased to have them.—ED.

Mew Gull mods

DEAR SIR,

We are interested to see your article in the February issue of the "AEROMODELLER" on the Percival Mew Gull, and as designers of the new cockpit cover which you referred to, we would like to bring to your notice two points:—

1. The increase in height of the cockpit cover was a requirement by the authorities covering air racing in this country, and one of the provisos was that this job should be done as quickly and as simply as possible in order to get the machine ready for a specific race.

2. The test pilot's report after flying the machine with the new cockpit cover was most enthusiastic, and stated that the rudder and elevator controls were in fact improved by the new cockpit and that the stall was now quite gentle.

As to the appearance of the machine now, we are fully aware of the fact that it no longer retains its sleek lines, but we have only had appreciative comments on its new look, as people seem to think that it has given the aircraft a more purposeful air, sometimes likening it to a small fighter.

How this machine was ever flown with the low cockpit is a mystery, as I personally, being rather short, had to bend my head forward whilst sitting in the cockpit, and I for one, am full of admiration for the men who flew it in that state.

Yours faithfully,

Cranleigh. D. M. ROBERTS (Director.)
ROBERTS AND WOOTTON LTD.

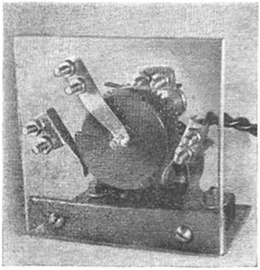
What's the answer?

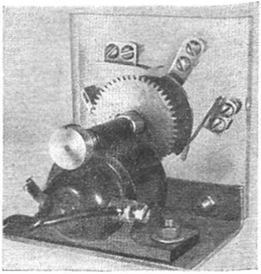
What would YOU do in a case like this? Think a moment, then twist the page for one solution printed below:—

Bob Smith was the club's leading rubber model flyer. But Bob has one problem which is really worrying him. Test flying his models—all right. But when it comes to putting on "comp. turns", nearing the last hundred or so, the propeller assembly repeatedly climbs around the winder hook. After talking it over, we designed a special gadget to fit the winder shaft where the winding hook fitted into a slot was held by a pin. That, at least, stopped the hook climbing but, as Bob says, you don't see the top rubber experts having trouble that way. What's the answer?

THE ANSWER . . .?

The reason why the propeller shaft "climbs" around the winder hook is that the shaft loop is too large. Reduce the diameter so that it is only a little bigger than the diameter of the wire from which the propeller shaft is bent and it will never "climb".





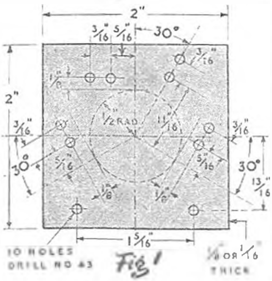
RADIO CON

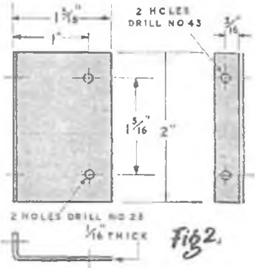
Reed "Rotacter" switch and

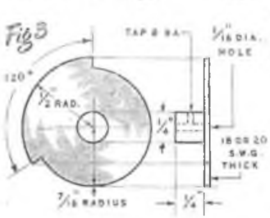
WITH REED UNIT operation the old scheme of progressive control seems to have given way to self-centring control for the sake of safety. While George Honest-Redlich and Sid Allen use one reed to give sequence operation of the elevator. Harry Cuckson uses one reed for up and one for down. Neither of these schemes gives proportional control, but with Harry Cuckson's it is possible to operate two controls at the same time with very little modification. The main item required is a rotating contact switch to make each control contact in turn. (Let us call it a "rotacter".) The credit for this device goes to Mr. E. L. Rockwood of America. Mr. Cuckson sent along a rough sketch of the sort of thing he uses, and H.B. has constructed the one shown in the diagram and sketches. Mr. Cuckson had his rotacter in operation on test at times during last summer and is using similar equipment for next season in a smaller and lighter model. The rotacter is not difficult to construct, and makes use of a Mighty Midget Motor complete with its 6 : 1 gearing, driving a disc from which two thirds of the circumference has been removed. This makes with each of the three contacts in turn, holding on each for a third of a revolution.

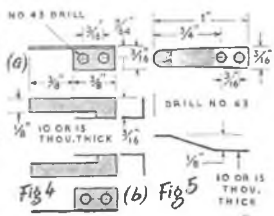
The photographs show the completed rotacter, and full working drawings are given, *Fig.* 1 is the contact support and can be made of paxolin or similar material. Perspex was used for the one in the photograph so that the parts could more easily be seen. *Fig.* 2 is the base plate and can be made of aluminium or brass. *Fig.* 3 is the contact disc made of brass. It is best turned from solid brass, so that the central hole is truly concentric with the circumference. It can however be built up from brass sheet with a boss soldered on. The circumference can be filed to a line drawn with dividers from the centre hole. This was the method used by the writer to ensure that it would be satisfactory. *Fig.* 4 shows the contact strips, two being required like **(a)**, and one like **(b)**. *Fig.* 5 is the strip to take the current to the disc. These contact strips can be made of brass or phosphor bronze about 10 to 15 thou. thick. It needs to be springy, but soft brass can be made springy by hammering it on the flat. Motors other than the Mighty Midget can be used, but a reduction gearing would have to be made up, and while the contact support could be used, a different base plate would be required.

The contact strips are fixed to the support with 8 B.A. brass screws, and this size is also used to fix support to base plate. The No. 43 drill mentioned is just



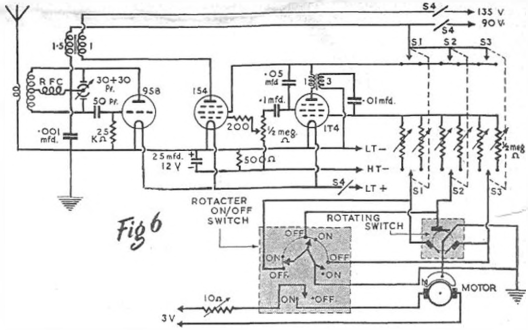






TROL NOTES

a stunt tank described by H. BOYS



big enough to clear the screws without allowing them to be too loose and let the parts wobble about. The strips can be bent to rub lightly on the disc. An 8 B.A. screw is used to clamp the disc on the shaft, and 6 B.A. are used to fix the motor.

The way this rotacter is fitted into the transmitter circuit is shown in *Fig.* 6. A four pole change over switch is incorporated which switches on the rotacter motor, and on switching this off, the grid circuits are earthed so that the transmitter can be used in the ordinary way. The 10 ohm variable resistor in the motor circuit is to adjust the speed for best operation.

The transmitter circuit is the same as that given in the August, 1954 "Aeromodeller" except that 6 reed tones are provided instead of 3. Each of the switches S1, S2, S3, are double pole change over with off position, though six double pole push buttons could be used. The switch S4 is a three pole on/off just for the batteries.

A slight modification is required to the receiver, but this only involves changing a few condensers. Supposing the rotacter rotates 5 revs. per second its period will be 200 milli-seconds. That means that if all the controls are operated there will be a period of approximately 130 milli-seconds before any one tone is repeated. During this time, with the circuit as shown in the July, 1954 "A.M.", the servos will fly back to neutral. However, if the 2 mfd. integrating condensors (relay circuits) are replaced with 10 mfd. condensors, a time constant of 15k x 10 mfd. = 150 milli-seconds will be achieved. Thus the relay will hold in for its rest period. In practice this delay of 150 milli-seconds is not noticed when controlling a model.

This multi-control system can be fitted to practically any reed type transmitter and receiver to enable one, two, or three controls to be held at the same time. Actually only one reed need be used for engine control using signal on for engine advanced, with automatic return to engine slow with signal off.

The Reed is not Immune!

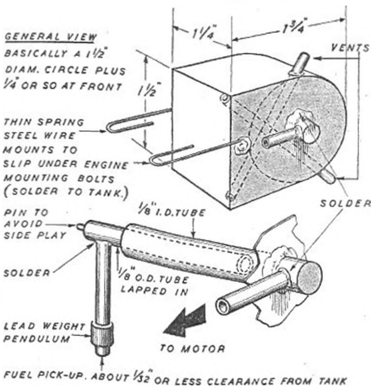
While on the subject of reed equipment it is interesting to note that the writer was trying a single valve receiver recently with a reed unit instead of a relay, just trying anode current change. A single valve unmodulated transmitter was being used as there was no intention of trying the reeds. However, with slight changes in the tuning it was possible to get the reeds vibrating. This could only be caused by the beat note due to the transmitter and receiver being very slightly out of tune. It just shows that an unmodulated transmitter can upset a reed type receiver!

The New Zealand model

Allan Rowe's R6-B design, introduced to A.P.S. last month scored a one-two-three victory at the New Zealand Nats. this year against stiff competition. Writing with further gen Allan states "Since the original, two R6-C's and an R6-D have been built. In general these have been straight aerobatic models, smaller and finer, and Elfin 2·49 powered—the latter with underslung fin and rudder to give control on the climb. (Where the 6-B rudders tend to be blanketed.)

"These models have been very fast, very exciting and very expendable. I still think I have most fun with the slower and less spectacular R6-B."

Details of the stunt tank used on the N.Z. models can be seen in the sketch below.



AEROPLANES IN OUTLINE No. 22

The MiG 15

IT IS CUSTOMARY for preparation of drawings included in this series to be based upon authentic material supplied by the manufacturers. The MiG 15 must perforce be an exception to this: and only for our own special reasons can we claim that the drawing opposite is to the usual A.P.S. standard of accuracy. There have been many varied angles of sweep, differing aspect ratios etc., for this fabulous fighter—few of them complying with actual photo's issued by the American authorities—and even the Crown Copyright silhouette represents an error of some three feet in fuselage length. Research through Soviet Satellite air magazines and confirmed dimensions now make a correct drawing possible.

Under consideration in 1946, the MiG 15 is attributed to a Russo-German design staff under the direction of Mikhail I. Gurevitch and although at one time the name of Mikoyan was linked with the final design, there still remains a shroud of mystery on the subject, to which is attached responsibility for the less successful "La-17". Within a year of conception, during which major design changes were made, the prototype flew across Tusino airport on Soviet Aviation Day, July 2nd, 1947—three months before the first flight of a North American Sabre.

Import of a R.R. Nene and its subsequent improvement into what was first known as the RD-45F, and then the WK-1 and 2 with water injection gave the MiG 15 (code name—*Falcon*) up to 6,750 lb. thrust, a parallel power to that of the J-47 in the F86 E and F. From the prototype through to the latest 15bis, airframe modification has been restricted to special types only. The two seat trainer offers greatest variation with the second pilots position where fuel is normally carried on the fighter, and permanent fitting of the 133 gallon Mosquito type underwing tanks. Its taller canopy hinges to starboard and fighter nose armament of two 23 mm. NS and one 37 mm. N cannon is not fitted. Other airframe changes include the use of wing fences to replace slats on the earliest versions, strengthening of the sliding canopy for the pressurised cockpit, and use of two shapes of fuselage airbrake. Larger sets have been seen on Czech aircraft; but the smaller, inclined airbrake is the more common and is used on U.S.S.R., Chinese, Hungarian, Polish and N. Korean types.

Six years of State factory production in Soviet countries has probably provided more MiG 15's in the World than any other aircraft type. Its war record is renowned—claims of victories in the order of 20 : 1 being made by both sides in the Korean conflict, and in spite of reported spinning and low speed difficulties, it is apparently accepted with the same favour as the Spitfire was with allied forces from '39 to '45.

Three examples have come into allied hands for examination. The first, in August 1951, was recovered from shallow water by H.M.S. Glory and proved to be a '48 model, built at Kuybyshev. The second was in March '53 when Franciszek Garecki of the Polish Air Force surrendered an intact MiG 15bis on the small grass field at Roenne, Bornholm in Denmark. The aircraft was subsequently dismantled and returned. Then in September, after the Korean campaign had finished, Noh Keun Suk earned an easy £35,000 by flying to Kimpo airfield thus delivering a MiG for complete examination and flight test at Okinawa by leading U.S. pilots. Evaluation with the Sabre for comparison gives the MiG a faster rate of climb and superior performance over 30,000 ft. with a general sacrifice on manoeuvrability at all altitudes.

Now coming into service, the longer, more swept, and larger MiG 17 (Fresco) is basically similar in layout, retaining the high tail position and large vertical tail surfaces.

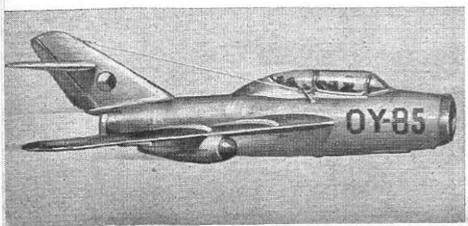
Data:

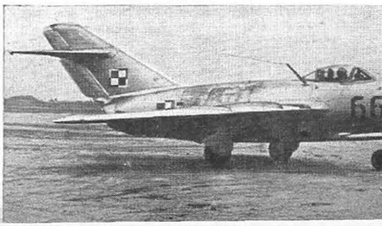
Span, 33 ft. 1½ in.: length, 36 ft. 4 in.: height, 11 ft. 2 in Wing area, 185.67 sq. ft. thickness/chord ratio 11%. Maximum airspeed 665 m.p.h. (bis., 745 m.p..h). All up weight, 11,085 lb. Fuel capacity, internal, 276 gallons. external, 267 gallons. Endurance, two hours at 49,000 ft. Service Ceiling, 51,000 ft. Initial rate of climb, 10,400 f.p.m.

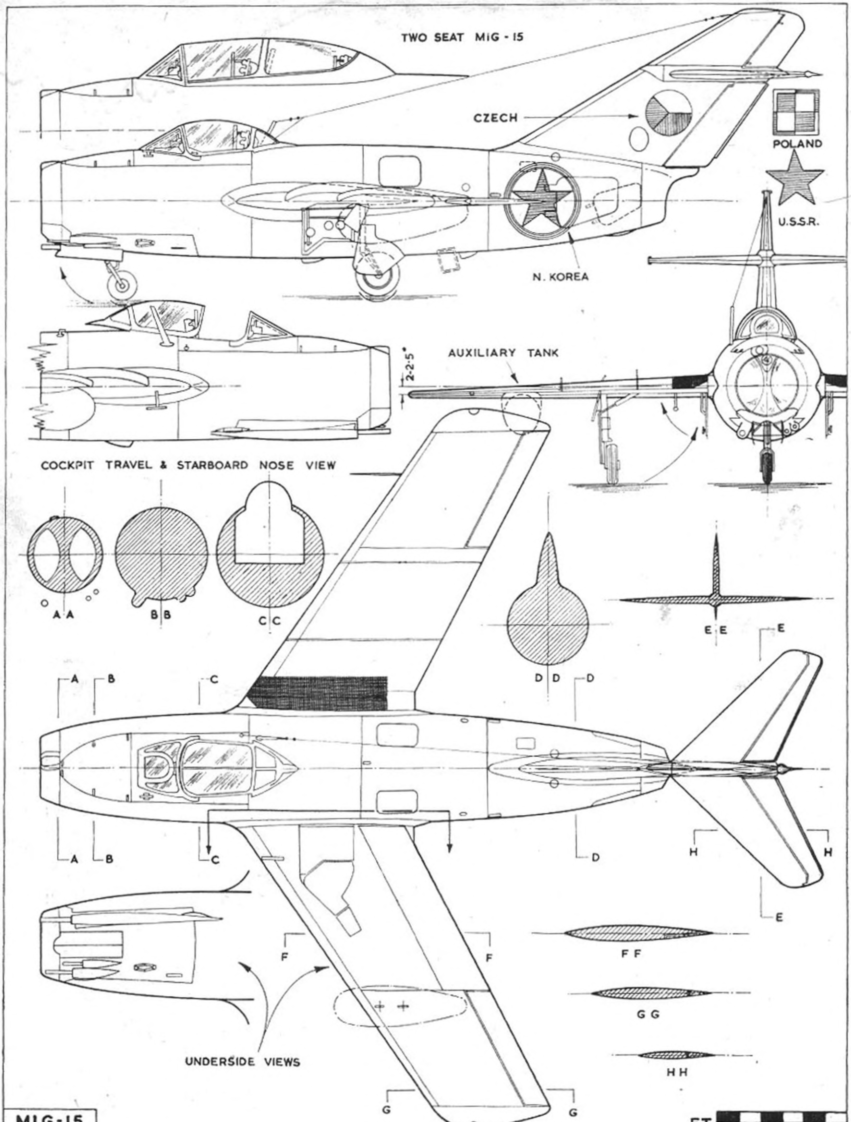
Colouring:

Natural metal finish with matt black anti glare nose panel, black walk ways, nose ident numbers, and national markings on fin and fuselage—not always on wings.

Comparison of two-seat trainer and single-seat fighter shows cockpit and external tank changes







"J TYPE" 1/72ND SCALE REPRINTS AND "A" TYPE 1/48TH SCALE DYE-LINE PRINTS OF THIS DRAWING ARE AVAILABLE FROM AEROMODELLER PLANS SERVICE PRICE 6d. AND 1/- RESPECTIVELY

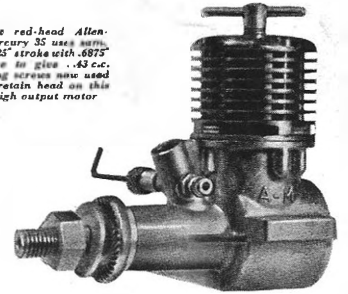
MOTOR MART

OWNERS OF "Dekko" and Fowler Vibra-Tak reed type rev. counters, can ensure consistent results by means of a slight modification to the end of the body from which the wire emerges. A frequent fault is that this end tends to spring open and thus fails to grip the wire, modifying the actual "free" length which responds to vibration. Filing or turning a notch in this end and binding tight, or fitting a spring clip, is a positive solution. The "Dekko" scale calibrations are less accurate than the Vibra-Tak.

A tip to those modellers who make up their own diesel fuel "brews"; Dave Sugden prefers "Derv" to paraffin for the basic fuel ingredient.

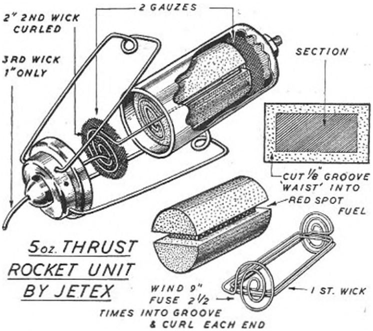
Following the successful introduction of the Allen-Mercury "25" it was only to be expected that this would be the first of a series of engines from designer Des. Allen. The Allen-Mercury "35" (3.5 c.c.) is now announced, priced 69s. 6d. (including tax). The "35" utilises the same crankcase unit with a slightly modified and strengthened crankshaft, thus dovetailing in with "25" production. Future new engines from the Allen-Mercury stable will almost certainly be of smaller capacity and as a consequence, development to production stage may take a little longer.

We would not have believed it if we had not had the opportunity of seeing a thrust test before our very eyes! That was the verdict of a recent visit behind the scenes at **Jetex** where we found the backroom boys hard at work. Subject for surprise is the new Jetex 50 Rocket unit we mentioned last month—for it now becomes the *most powerful* of all the Wilmot Mansour units, even topping the 5 ounces gleaned from the big Scorpion unit! On the reaction rig used by the factory, a 50 "R" actually pushed the thrust measurement fluid beyond the top of the scale (5¾ ounces), but of course, only for three seconds and not the 11 seconds we expect of the Scorpion.

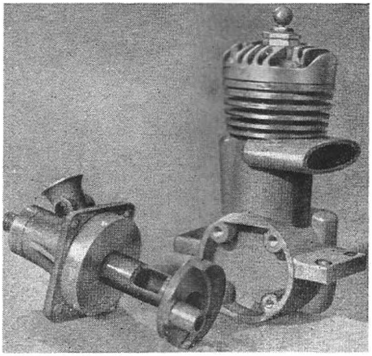

New red-head Allen-Mercury 35 uses same .5625" stroke with .6875" bore to give . .43 c.c. Long screws now used to retain head on this high output motor

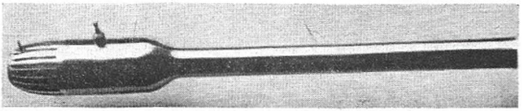
This new version of the 50 has to have two springs to hold such a fast burning charge—and care has to be taken in seeing that tension is at a maximum after each re-load. The secret of obtaining ten times normal thrust is simple, and though explained in each of the Dan Dare Space Ship kits for which it was created, many builders still lack the "know-how" which we hope is conveyed by the following sketch. Red Spot fuel is filed with a deep waist line all round the charge. Three pieces of wick, totalling 12 in., two gauzes and careful loading make sure that the fuel burns fast and furious.

Owners of standard 50B units are advised not to try loading this way; there is no advantage for free-flight and high pressure leakage soon ruins the case and tension springs.



5oz. THRUST ROCKET UNIT BY JETEX





Above: Jap. ENYA 19, 3.25 c.c. engine dismantled to reveal unusual radial mounting and large crankshaft valve

Left: Home built pulse jet by Jan. O. Thylen of Stocksund, Sweden, is only 13 in. long, max. dia.: 1¼ in. and weighs [illegible] oz. Diffuser head is magnesium with longitudinal cooling fins

Try '$\frac{1}{2}$A' Team Racing with an accurate scale

Hawker Tempest

By C. M. Milford

Radlett visitor admires C. Milford's handiwork on this snappy little scale racer. Four blade prop is a pair of lap joined 6 X 4's.

THIS IS A model of one of the world's last and fastest piston-engined fighters The prototype is one of the very few which are really suitable for scaling-down as team racers

The plan shows the "$\frac{1}{2}$A" version, powered by the E.D. Bee or Allbon Spitfire. Class "A" Team Race motors will exactly fit into a larger version, scaled up in the ratio 4 : 3, which gives a wing area of 81 sq. in., and a scale of $\frac{1}{2}$ in. to 1 ft.

Construction

Begin with the wing, cut from soft $\frac{1}{4}$ in. sheet balsa. The undercarriage is bent from 16 g. piano wire, stitched to its two spars of $\frac{1}{16}$ in. ply and let into saw cuts in the wing; these spars also act as dihedral braces.

The bellcrank is "double-sided", of thin dural sheet bent round so as to fit onto its pivot bolt above *and* below the wing. This prevents it from twisting under the pull of the lines.

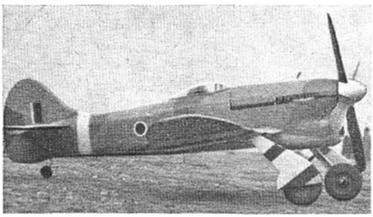
The lead-outs (of light Laystrate) run in slots cut in the centre section under-surface. At the dihedral-break, the lines come out through short aluminium tubes and a wire guide at the wing tip. When this is complete, the front fuselage sides complete with engine bearers are slid into place and cemented. Fix F2, F3 and the rear sides. When they are dry, chamfer inside edges of sides at tail, and cement them together.

Make up the tailplane/elevator unit and assemble the pushrod. Add the fin/rudder and F4, F5. Stitch the tailwheel leg to a small piece of ply and cement in place; add the $\frac{1}{8}$ in. sheet underside. Complete nose intake with block sanded to shape. The top decks are steam-bent from sheet. Add wheels, pilot, fillets and dummy exhausts; canopy *after* doping.

If the celluloid u/c cover plates are attached with Sellotape, they can be removed for flight. The model is actually better without them in flight, as the wheels are then not so noticeable, which improves the realistic appearance.

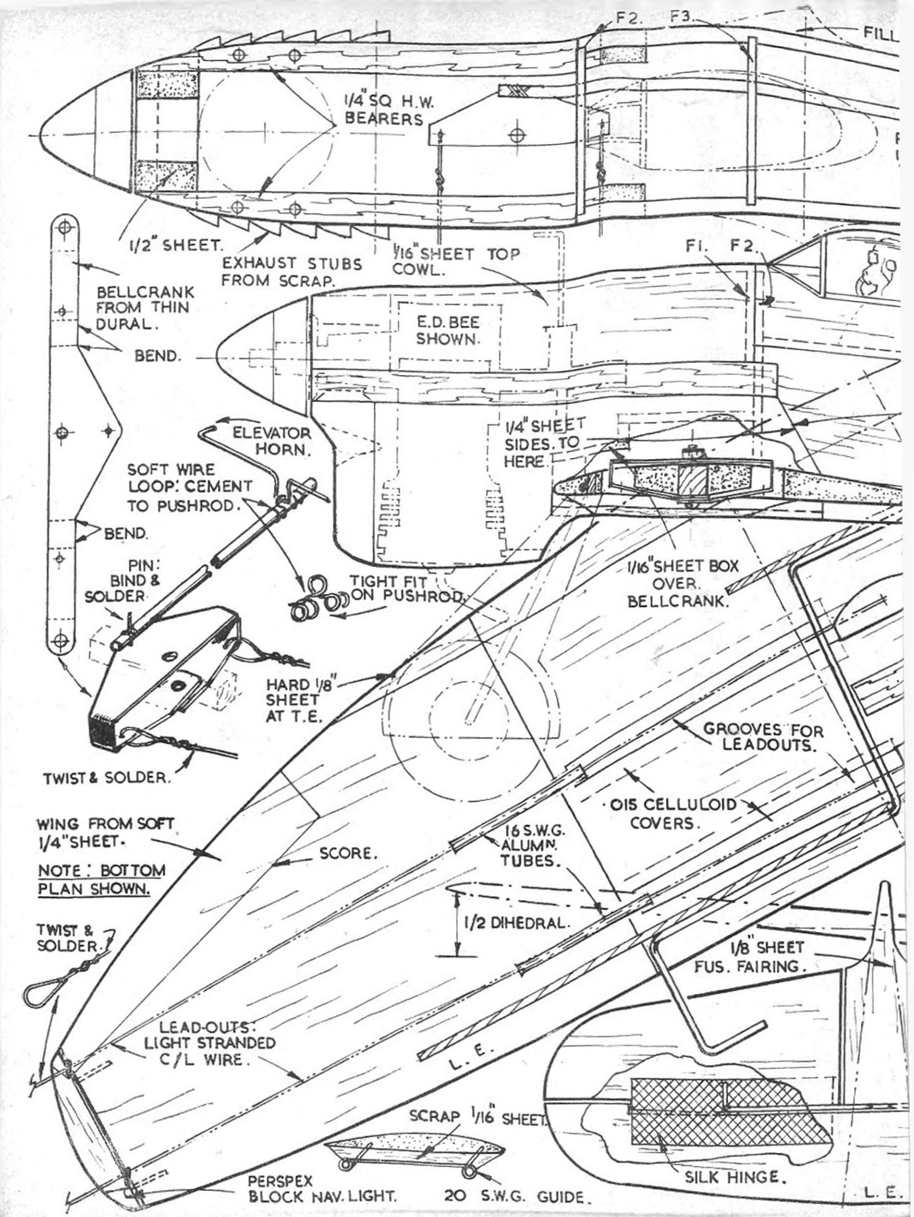
Colour scheme is standard R.A.F. camouflage of dark grey and dark green, with light grey underside. Black and white invasion stripes were used in 1944, but later Tempests used on the Continent in 1945 had plain undersides.

Fix up a suitable tank (the Cambridge Races specify 7·5 c.c.) install the engine and the model is ready. Any of the 0·5 c.c. engines can be used especially if the model is built from light wood throughout: but for the 30 ft. lines used in racing, a 1 c.c. motor is really essential. Also the baby motors are much happier side-mounted, whereas the Bee or Spitfire start quite easily inverted, since it is not necessary to prime through the ports in an engine of this size. A little fin "tailoring" is necessary to get the bigger cylinders in the cowl: but not to any detrimental effect on cooling.

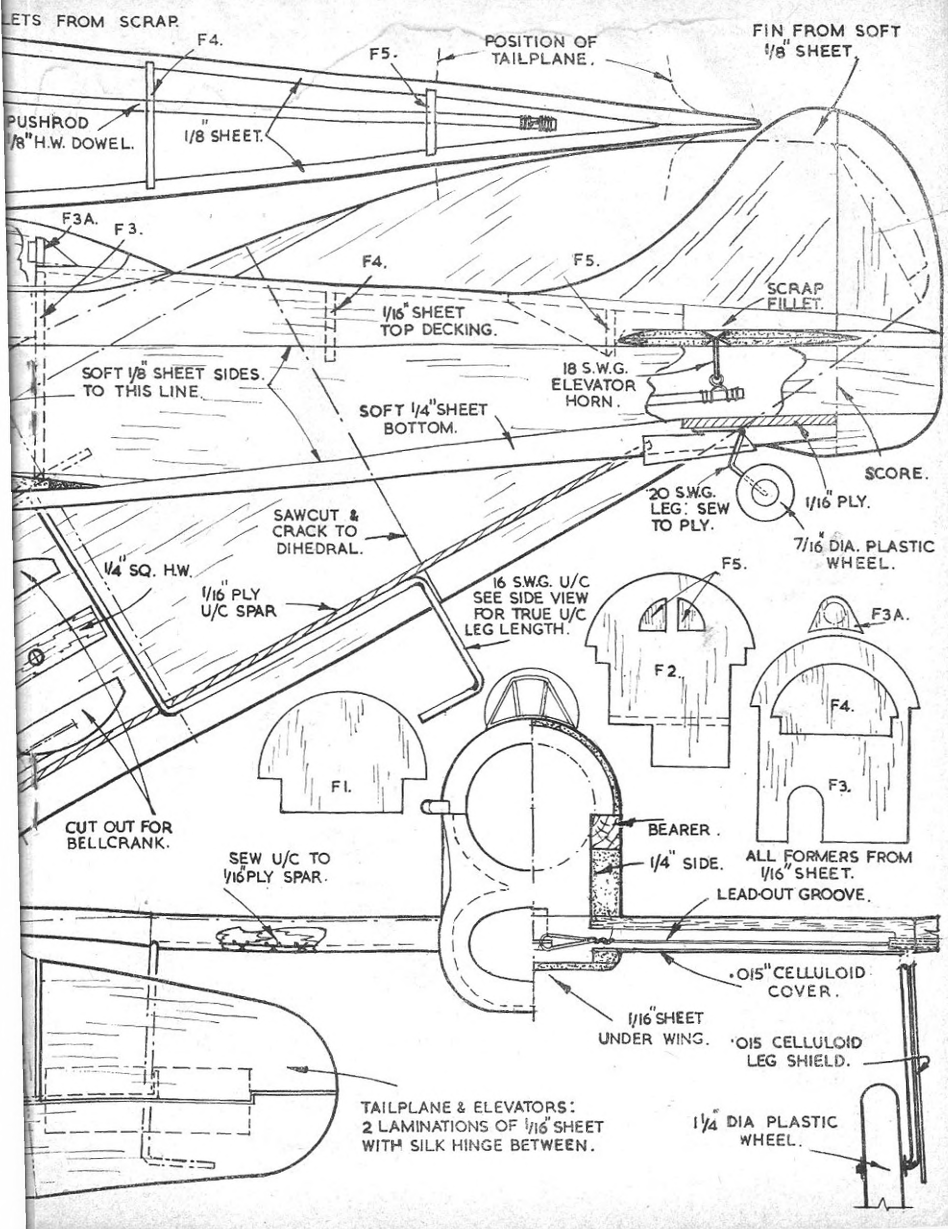


Detachable cowl line gives away this view as being a model, otherwise the scale is perfect. Use 6 X 6 two blade prop for best performance

Full-size plans overleaf



F2.
F3.
FILL
1/4" SQ H.W. BEARERS
1/2" SHEET.
EXHAUST STUBS FROM SCRAP.
1/16" SHEET TOP COWL.
F1.
F2.
BELLCRANK FROM THIN DURAL.
BEND.
E.D. BEE SHOWN.
ELEVATOR HORN.
1/4" SHEET SIDES. TO HERE.
SOFT WIRE LOOP: CEMENT TO PUSHROD.
BEND.
PIN: BIND & SOLDER
TIGHT FIT ON PUSHROD.
1/16" SHEET BOX OVER. BELLCRANK.
HARD 1/8" SHEET AT T.E.
GROOVES FOR LEADOUTS.
TWIST & SOLDER.
·O15 CELLULOID COVERS.
WING FROM SOFT 1/4" SHEET.
NOTE: BOTTOM PLAN SHOWN.
SCORE.
16 S.W.G. ALUMN. TUBES.
1/2 DIHEDRAL.
TWIST & SOLDER.
1/8" SHEET FUS. FAIRING.
LEAD-OUTS: LIGHT STRANDED C/L WIRE.
L. E.
SCRAP 1/16" SHEET.
SILK HINGE.
PERSPEX BLOCK NAV. LIGHT.
20 S.W.G. GUIDE.
L. E.



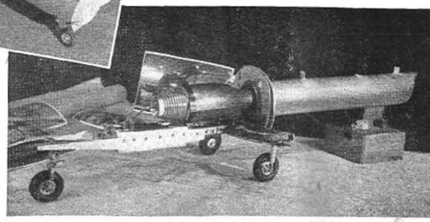
LETS FROM SCRAP.
F4.
F5.
POSITION OF TAILPLANE.
FIN FROM SOFT 1/8" SHEET.
PUSHROD 1/8" H.W. DOWEL.
1/8" SHEET.
F3A.
F3.
F4.
F5.
SCRAP FILLET.
1/16" SHEET TOP DECKING.
SOFT 1/8" SHEET SIDES. TO THIS LINE.
18 S.W.G. ELEVATOR HORN.
SOFT 1/4" SHEET BOTTOM.
SCORE.
20 S.W.G. LEG: SEW TO PLY.
1/16" PLY.
7/16" DIA. PLASTIC WHEEL.
SAWCUT & CRACK TO DIHEDRAL.
1/4" SQ. H.W.
1/16" PLY U/C SPAR
16 S.W.G. U/C SEE SIDE VIEW FOR TRUE U/C LEG LENGTH.
F5.
F2.
F3A.
F4.
F1.
F3.
CUT OUT FOR BELLCRANK.
BEARER.
1/4" SIDE.
ALL FORMERS FROM 1/16" SHEET.
SEW U/C TO 1/16" PLY SPAR.
LEAD-OUT GROOVE.
·015" CELLULOID COVER.
1/16" SHEET UNDER WING.
·015 CELLULOID LEG SHIELD.
TAILPLANE & ELEVATORS: 2 LAMINATIONS OF 1/16" SHEET WITH SILK HINGE BETWEEN.
1 1/4" DIA PLASTIC WHEEL.

Dynajet Sabre by Donavour-Hickie should fly this year.

★ Models of the month

the SABRE and

Control-line scale fighters with



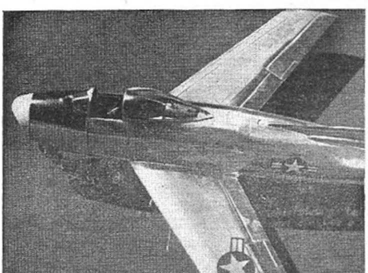
SPEARHEADS OF THE opposing forces in the Korean conflict, and each the principal fighter for Nations, East and West, the North American F.86 and MiG 15 swept wing types have been the subject of many a technical comparison. Their relative merits are well matched, and this month our regular Model News feature is devoted to two equally comparable models, one from England, the other from Czechoslovakia.

Peter Donavour-Hickie of Horley in Surrey chose the F.86 A, Series 2 Sabre with its larger than normal fuselage and a.i intake and the "6/3" type wing with fixed leading edge. Scale of ⅞ in. to 1 ft. produces a model 35 inches long and 32⅝ in. span, while all-up weight including the Dynajet, but less fuel, is 5 lb. 4 oz. The undercarriage is retractable, with the nose wheel executing a 180° twist as it swings back to lay flat under the nose. All of the retracting mechanism, most of the centre section structure, the mainspar and bearers, are from 22 gauge mild steel, then ply formers are bolted to the metal, and for the rear fuselage, a 2½ in. diameter aluminium tube provides a cooling duct. Further insulation with asbestos cloth around the combustion chamber and the use of glass fibre for the nose and underside, reduce fire risk and achieve true scale shape with a maximum of structural strength.

Glass fibre is also used for wing and fin tips, while ⅛ in. balsa planking over the rest of the airframe is tissue covered, then finished with silver metal wallpaper for realism— and the photos show just how realistic such a finish can be. Unfortunately for Peter, a serious road accident interupted construction of the model and subsequent convalescence has restricted his flying activity so flight trials are yet to come. As Peter states, "I am very anxious to get the plane in the air myself", we hope that it will be our pleasure to see the Sabre in action at one of the big rallies in '55.

As a point of interest, although models of this calibre are few and far between on this side of the globe, we believe they are quite a regular feature of Japanese control-line meetings. A pre-fabricated kit for the F.86 Sabre is specially manufactured for the Japanese OS pulse jet, and like Peter Donavour Hickie's model, they employ wood and metal construction.

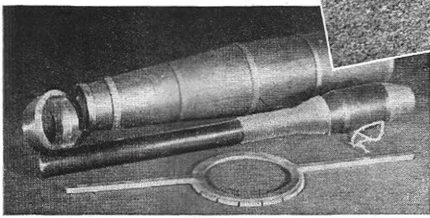
Silver wallpaper embossed with scale rivet lines and exact control surfaces gives enviable realism. Sliding canopy over detailed cockpit and detachable rear fuselage for Dynajet access are visible in these views whilst the bare facts of the fuselage spine and cooling duct are seen above. Countless photographs and copious drawings of full-size aircraft were used to ensure accuracy.



the MIG 15

pulse-jets from East and West

MiG 15 by Emil Brauner flies at 85 m.p.h. on home-built jet

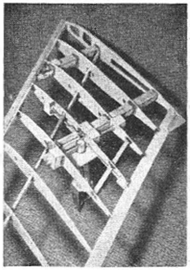


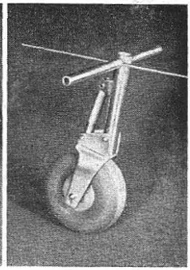
It flies at 85 m.p.h.—all credit to its clever designer who made every single part, including the wheels.

The wings appear to slip over stub spars projecting from the fuselage which are of metal reinforced plywood to take the landing loads. Wings then are detachable for transport, and held in place by small screws for flight.

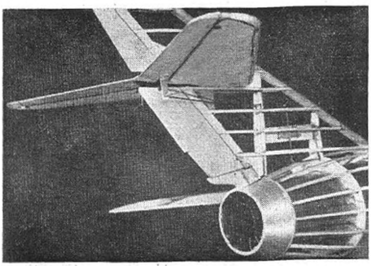
ODDLY ENOUGH, although the Mig 15 is standard equipment for the Czech Air Force, Emil Brauner of Kladno used the AEROMODELLER solid model drawing as a basis for his model, with amendments to bring the detail up to date. None of the Soviet mags. have ever published a detailed plan of this, their common fighter. Span is 43½ in., the weight 5 lb. 6 oz., and like the Sabre, construction is a mixture of metal work, balsa and hardwood. An aluminium foil duct around the jet unit provides a flow of cooling air, while the space between the foil and outer balsa planking is filled with glass wool. Asbestos rope is wrapped around the hottest part of the home-built jet (details of which are to appear in a future issue) and for starting, the canopy section is detachable.

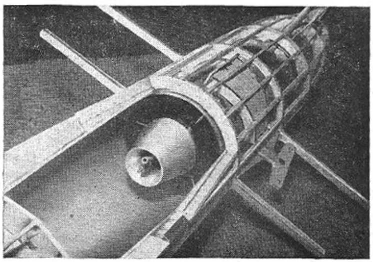
Doped aluminium, and already a veteran flier, the MiG lands softly on the near-scale lever suspended undercarriage legs which have telescopic coil springing.





Hardwood framework for the involved high tailplane situation and double crank linkage for elevator motion are seen below left, with engine access, bellcrank and spars at right. Above: the port wing shows how box spars slip over the uselage projections, with lever suspended undercarriage in close up. Upper photo of the Brauner Jet, which is 22 ins long and delivers 3½ lb. thrust shows rear and front mounting rings.





Jeff Hancock's

snub nosed rally winning A/2 glider

Shorty

BORA GUNIC started the short nose glider fashion when he flew his B.G.44 to first place in the 1952 A/2 at Graz in Austria, and quite a few modellers followed his style by massing all the ballast in as short a nose as possible. Among them was Jeff Hancock of the Surbiton club—a regular competitor of note in all London area events and close companion of Pete Buskell, John Barker, etc.

Jeff decided to go "ultra-short" early in '54 and started a series of contest wins to outline the value of his approach. At the Croydon Gala he placed first with 12 : 00 (maximum total). At Northern Heights, he tied for first place with two five-minute max's then slipped to third with a poor fly-off time, and at the Radlett meeting he came second.

To start the ball rolling right for '55, fourth position in the closely contested Blackheath Winter Glider contest—only 6 secs. short of double maximum time with 5 : 54—was proof indeed that "Shorty" is still in the groove for the coming year. Jeff uses a one-piece wing; but details are given on the plan for separate halves as an aid to transport. One thing about this A/2 design is that the fuselage will comfortably fit any model box!

The **Fuselage** is constructed on the former F4., and the lower ¼ inch square hard balsa lower longeron. Cement to this the tow hook, bound to hard ¼ inch balsa, and also add the d/t hook. The vertical formers F.1, F.2, and F.3 are next cemented in place. Add the former F.3 and the top ¼ in. square hard balsa longeron, taking care to chamfer the end of the longeron where it meets the lower longeron at the rear of the fuselage; also cut the slots in the top longeron to accommodate the fin, which is added at a later state of construction. Position the auto rudder arm, and attach the nylon thread auto line. The sides, cut from medium soft ⅛ inch sheet, are added filling in around the nose with 1/16 inch sheet balsa, having a hole to pour in the lead ballast weight. Add scrap block balsa behind the rear wing mount position, and before adding wing mounts and dowels sand the whole structure smooth and round off sharp edges. Next construct the **Fin,** winding the outline form with 1/32 in. sheet balsa strips around a cardboard template (the wing tips are made in the same manner). Cement the fin into the slots in the fuselage and add wing and tailplane mounts, dowels, and hooks for rubber bands, etc.

The **Wings** are of straightforward construction. Begin by laying down the outline on the plan, taking care to pack up the trailing edge to the correct camber. Cement the ribs in place, and, when dry, remove from the plan and carefully slot the spars into place. Carve the leading edge to allow the 1/16 inch sheeting to overlap. Cut the wing at the dihedral break, and cut the spars to the correct dihedral angle, precement the ends of the spars to be jointed, and cement the tip in place. The 1/16 inch sheeting on the leading edge is now cemented in position. Carve any parts of the wing that may need shaping, and sand to a smooth finish.

No dihedral braces are used in the construction of the wing, as an accurately constructed butt joint is strong enough for the greatest forces imposed on the wing in towing. In the event of a hard landing the tip will break off cleanly, without breaking spars, thus avoiding a field repair that would otherwise be a long job and possibly impracticable in the time available.

The tailplane should need no explanation, but emphasis must be laid on keeping the structure as light as possible. Cover the wings and tailplane with jap tissue or lightweight Modelspan.

When complete, assemble the model and pour molten lead into the nose in gradual stages to get the C.G. in the right position.

Before trimming, assemble the model, check wings and tailplane for warps, and make sure the auto rudder is perfectly free. Lastly, check the C.G.

When in correct trim, a hand launch should result in a smooth shallow glide to the right. Correct any tendency to stall or dive by packing under the tailplane before towing up for the first time. The best performance is obtained when trimmed in wide circles. If lift is encountered the turn tightens up considerably with no tendency to spiral dive.

Full-size copies of the 1/4th scale plan reproduced opposite can be obtained, price 4/6d. post free from the "AEROMODELLER PLANS SERVICE", 38 Clarendon Road, Watford, Herts

A 68" SPAN A/2 WORLD CHAMPIONSHIP GLIDER

SHORTY

DESIGNED BY

C.J. HANCOCK.

4/6

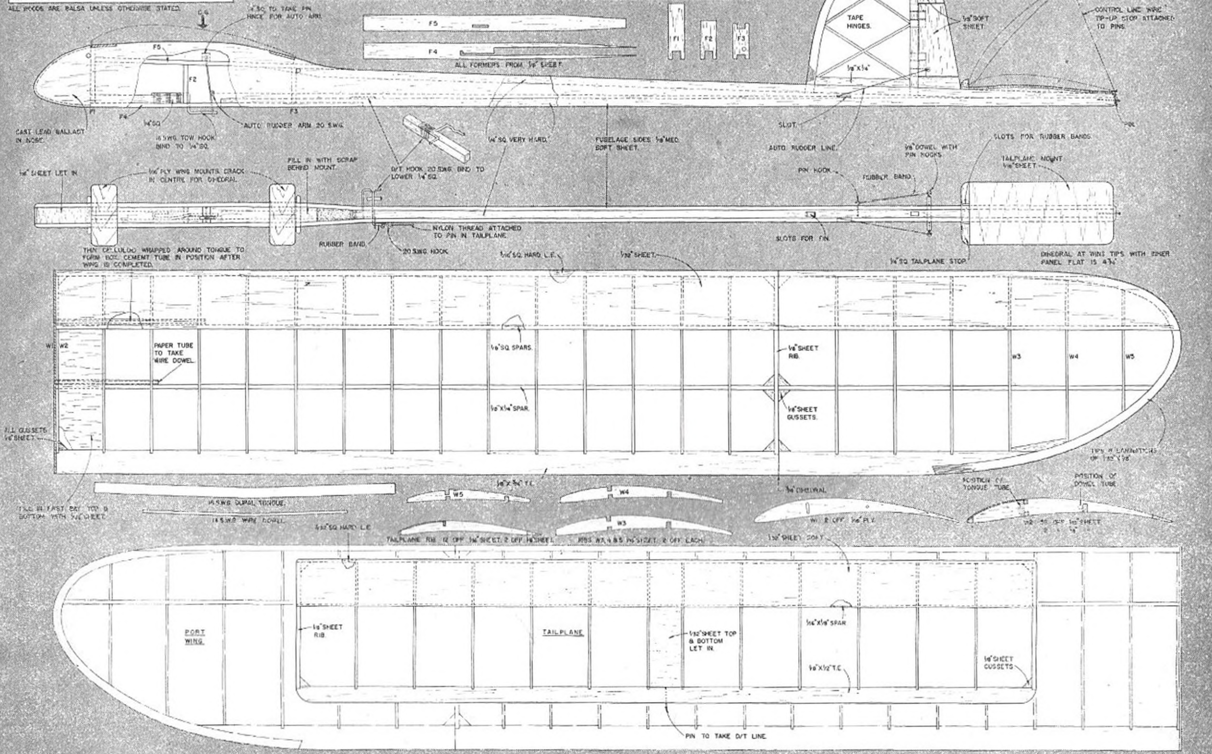
DATA.

WINGSPAN.	68"
WING AREA.	419·2 SQ"
TAIL SPAN.	23"
TAIL AREA.	103·5 SQ"
TOTAL HORIZONTAL AREA.	522·7 SQ"
WING INC.	+4·5°
TAIL INC.	+1·5°
TOTAL WEIGHT.	14·6 OZS.
O/A LENGTH.	33·75"

MATERIALS REQUIRED.

1 STRIP OF 1/16" X 1/8" X 36" BALSA.	2 SHEETS OF 1/16" X 3" X 36" BALSA.
1 " " 3/32" X 3/32" X 36" "	1 " " 1/8" X 3" X 36" "
4 " " 1/8" X 1/8" X 36" "	4" OF 1/8" DIA. DOWEL.
2 " " 1/8" X 1/4" X 36" "	7" X 3" OF 1/16" PLY.
1 " " 1/8" X 1/2" X 36" "	6" OF 16 S.W.G. PIANO WIRE.
2 " " 1/8" X 3/4" X 36" "	7" " 14 " " "
2 " " 3/16" X 3/16" X 36" "	10" " 20 " " "
2 " " 1/4" X 1/4" X 36" "	SHEET OF THIN CELLULOID.
3 SHEETS " 1/32" X 3" X 36" "	10" X 1/2" OF 16 S.W.G. DURAL.

ALL WOODS ARE BALSA UNLESS OTHERWISE STATED.



PUBLISHED AEROMODELLER APRIL 1955

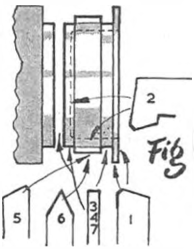
G.493

Making your own ENGINE

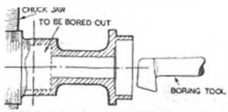
Part five — **Machining Operations** — by Dave Sugden

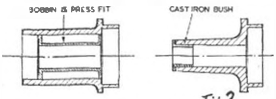
THE COMPONENTS will be dealt with in the order which has been found best in obtaining the most satisfactory mating of parts. A knowledge of the metals and tools to be used will be assumed as this was covered in January and February.

Back Cover. *Fig.* 1. In order to machine this part without resorting to a jig it must be set up as shown. This means that the threads cannot be tried for fit and so must be made prior to those of the crankcase. The order of machining is not really important, that indicated is as good as any. See that the sealing face is true and has a good finish and that the threads are satisfactory before parting off.

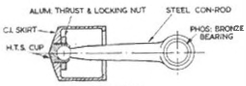


MACHINING BACK COVER

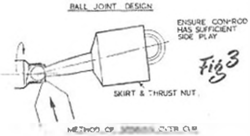




ALTERNATIVE DESIGNS Fig 2



BALL JOINT DESIGN



Crankshaft housing. Where a ball race is required, it cannot be machined directly but must be parted off, turned and bored from the other side. *Fig.* 2. The part could be shrunk on to a mandrel turned up in the chuck, but if it slipped with subsequent machining the results might be disastrous. It might be possible to use a steady on the outside of the bearing housing so that the boring is concentric with the outside which is true with the rest of the part. A special jig could also be used for the same purpose. These methods are involved and a modification of design as shown surmounts the problem easily. The front ball race could be dispensed with and a plain bearing substituted. Front ball races are hardly worth the extra effort anyway.

Ball Joint con-rod-piston assemblies require special spinning equipment for the cud fitting used up inside the piston. Alternative is to use a composite piston as shown in *Fig.* 3, where the piston skirt is secured and soldered to the cup after spinning. The ball end is turned, filed, and lapped spherical with a piece of copper tubing and grinding paste. A specially ground drill will form the cup contour which is spun round the ball end with a piece of steel, held in the tool post, and well lubricated.

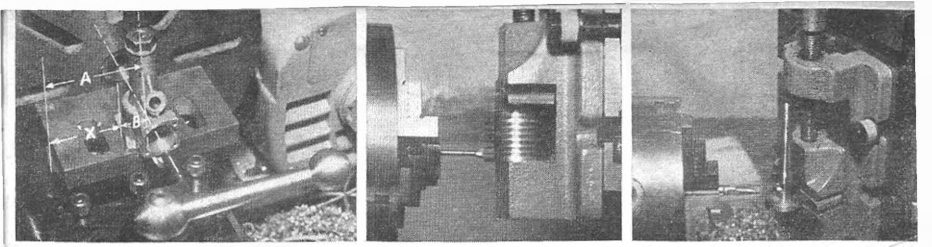
Cylinder Head. *Fig.* 4. This consists usually of simple turning and should present little difficulty. It is easiest to turn the fins before applying the contour. A centre will reduce chatter if this is troublesome. Bore out the inside after completing the fins and do not forget to drill and tap the hole for the compression adjuster before parting off. The order shown is best.

Crankcase. Having gained some experience on easy parts we now turn to something demanding a little more care. By means of the special cast on boss, or at some alternative suitable position, the casting is gripped very firmly, since castings tend to work loose in the chuck. The inside is drilled and bored, the threads are cut and fitted to the back cover and the crankshaft hole and bearing is carefully drilled and reamered. This must have a true finish to permit the crankshaft to run freely, an essential for high power output. A lapped finish on plain bearings where the shaft runs directly in the casting is not recommended due to the difficulty of removing all the grit. Turning out the housing for a ball race on a crankcase of a motor as illustrated has been found to be the most difficult job in the whole engine. It requires a very sharp tool and the utmost skill and patience to obtain the correct fit (see table). It has been found best to use the actual bearing as a plug gauge but be very careful to see that no swarf enters it.

Work on the upper region of the crankcase, where the cylinder fits, can be done next but it is best left until the crankshaft, cylinder, piston and con rod are finished, so that it can be fitted to the cylinder and ports and be turned down to the height which will give the correct part opening. In this way accumulated errors on the various parts which can completely upset port timing are eliminated.

The angle plate is bolted on to the face plate at the distance of the cylinder axis from the rear face of the crankcase below the centre level. The distance A (*see* photo) of one of the angle plate ends from the centre is measured accurately with a rule and the distance B of the appropriate side of the crankcase from the crankshaft axis is similarly measured. The crankcase is then mounted squarely on to the angle plate at distance X=A-B from the end which puts the cylinder axis true for the subsequent machining which is straight forward.

Do not take heavy cuts since the part may easily be put off centre. It might be convenient to mill out transfer passages or drill the carburettor hole by mounting an



Left: Centring the crankcase for boring; Measure A and B on angle plate and c/case, setting dimension X equals A minus B. Centre: Using a dental burr to mill away fin for holding down nuts on an early engine. Right: Milling the crankshaft induction port to marks scribed through throat in c/case. Note use of Myford Vertical slide

electric drill on the cross slide while the job is still set up.

Con Rod. *Fig.* 5. The most difficult part in making this item is in drilling the holes at the correct spacing and ensuring that they are true. Whether the rod is being filed from solid or turned from bar it is best to finish the holes first. With care they can be drilled from centre pops reasonably accurately under a pillar drill, but the most reliable method is to mount the work on a vertical slide, putting the drills in the chuck. By moving the work across the lathe bed with the cross feed, the centres can be positioned quite accurately. Start the drills with a centre drill and see that the last drill leaves the correct amount for reaming.

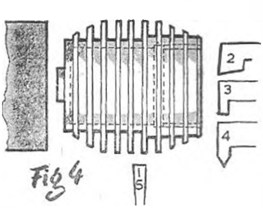


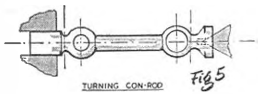
Fig 4

MACHINING CYLINDER HEAD

For turning a rod enough metal should be allowed for a centre at one end and a boss at the other. The centres for these must be marked out accurately so that the holes will be on the centre line of the rod and be square to it. The boss is nipped to run true in the chuck whilst the other end is supported with the centre. A form tool will assist in shaping the ball ends but a file will produce the required shape without effort. Part off when as much as possible has been turned and finish by hand.

Big End Bushes. These and any other bushes should be of fairly stout proportions, *i.e.* a wall thickness for one suitable for a 2½ c.c. motor should not be less than 20 thou. When turned and drilled they should be the tightest possible fit. The con rod is forced on and trued up squarely before the bearing is finally reamered out and sawn off.

Crankshaft. *Fig.* 6. There are many ways of making crankshafts, but the one described has been found to be the easiest and most reliable. Drill a centre in one end of the bar and a hole for induction or lightening in the other, being careful to see that a line joining them is parallel to the outside surface. If the chuck is out of true the bar must be suitably packed to ensure this, otherwise the crankpin will not be true with the shaft. Plough off some of the excess metal round the shaft leaving enough to chuck for turning the crank pin.



TURNING CON-ROD Fig 5

By mounting either in a 4-jaw chuck, or in a 3-jaw chuck in which No. 3 jaw has been removed whilst the other 2 jaws have been wound in, with 2 or 3 revolutions of the scroll, before it has been replaced, and using packing if necessary, the bar is set up with the required amount of eccentricity to give the correct stroke. When rotated the throw of the bar is the stroke of crankshaft. This can be measured with a steel rule to 2 or 3 thou. or by winding the tool from a setting with the bar on one side to one when the bar is diametrically opposite, taking readings of the movement from the dial collar. The accuracy of this method depends upon the quality of the screw thread but should be good enough for our purposes. Having mounted the work piece solidly and with as little overhang as possible on it and the tool, turning of the crankpin can proceed at as fast a rate as the lathe and tool will permit. Do not allow the tool to deflect under the impact loading and be careful not to chip it. A sharpened tool will probably be needed to make the finishing cut which should leave 1 thou. on crankpin diameter. A Swiss file will easily bring the pin nearly to size, leaving a good finish which is quickly polished to an accurate fit with fine emery cloth backed up with

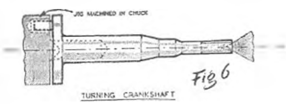
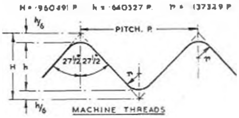


Fig 6

TURNING CRANKSHAFT

BALL BEARINGS
(Dimensions in inches unless stated otherwise).

Type bore.	Width	Outside dia.	Weight	Limits of shaft	Limits of housing	Abutment dia. shaft	Abutment dia. housing.	Manufacturers' Code No. F.B.C.	Hoffman	R & M	S.K.F.
4 m/m	5 m/m	13 m/m	.166	.1569 .1564	.6305 .6297	.281	[illegible]	R4	104	LJ4	R4
6 m/m	6 m/m	19 m/m	.288	.2356 .2351	.7486 .7478	.375	.625	R6	106	LJ6	R5/6
8 m/m	7 m/m	22 m/m	.432	.3144 .3139	.8667 .8659	.437	.75	R8	108	LJ8	R7/8
1/4	7/32	3/4	.256	.2495 .2490	.7502 .7495	.40	.62	EE2	S.1	KLNJ1/4	EE2
3/8	7/32	7/8	.40	.3745 .3740	.8752 .8745	.53	.75	EE3	S.3	KLNJ3/8	EE3
1/2	1/4	1 1/8	.482	.4995 .4990	1.1252 1.1245	.68	1.0	EE4	S.5	KLNJ1/2	EE4



MACHINE THREADS

TPI	Pitch in.	Standard thread depth, in.	Outside dia.	
			min.	max.
40	.025	.0160	[illegible]	1½
36	.02778	.0178	[illegible]	1¼
32	.03125	.0200	[illegible]	1¼
28	.03571	.0229	[illegible]	1¼
26	.03846	.0246	[illegible]	3 in.
24	.04167	.0267	[illegible]	3 in.
20	.050	.0320	[illegible]	3 in.

a rule. Be careful not to round the corners and use long strokes with the file to reduce the chances of the pin being put out of round. The big end should be a smooth tightish fit and is tried for fit, when thoroughly cleaned.

To turn the shaft a simple jig is made as illustrated. A hole is drilled off centre and a tapered boss is turned which fits into the hole drilled up the centre of the shaft. To prevent frettage corrosion a piece of soft metal shim is wrapped round the crankpin, which transmits the drive, before it is fitted into the hole in the jig, with the boss acting as a centre at the crankpin end, and the tailstock centre steadying the front end. Use tallow to lubricate this centre if possible. The centre is tightened up just sufficiently to take up any end play but be on the lookout for any chatter, indicating looseness or squeaking, a warning that the centre is burning out. Check the centre occasionally and always before making an important cut. The turning is straightforward and bearings are finished in a similar manner to the crankpin.

The induction hole is milled, sawn and/or drilled and filed to marks scribed on at the internal corners of the carburettor intake, when the shaft is set up in its housing in the correct opening and closing positions.

Cylinder. This is simple turning work and should present no difficulties. Complete the turning before finishing the bore. A good reamer provides the easiest means of obtaining a suitable finish but failing this—boring will produce the desired result with care. See that the tool is well sharpened and makes the last cut without spring *i.e.*, continue to make passes along the bore at the same tool setting until it ceases to cut. The bore should then be parallel and true.

The ports come next. It may be found convenient to use the piece nipped in the chuck to grip in the vice whilst filing or milling out the parts, so mark the position of No. 1 jaw before taking the work out of the chuck so that it can be rechucked accurately for parting off. Milling out of radial ports is easily done with a fly cutter, see part III on milling, set to the correct radius. The cylinder is held in a machine vice bolted onto a vertical slide or angle plate mounted on the cross slide. A small drilling jig will be necessary to prevent the drill from running if ports are to be drilled. Much patience is required if they are to be sawn and filed out.

Having finished the ports and parted off the cylinder it may now be heat treated but make it as hefty as possible to minimise distortion when quenching. The last job of all is lapping. To reduce friction it is a good plan to lap cylinders bell-mouthed so that the piston is a loose fit at the bottom of the stroke, where a good compression seal is not necessary, and is a tight fit up the bore where good compression is essential. When mating the piston it is then easy to judge the fit by the distance it will pass up the bore.

Gudgeon Pin. Ground silver steel rod is used here. It can be drilled out for lightness (hole ½ to ⅓ of the outside diameter depending on the general proportions) and dural or brass end pads inserted. However, use a good drill otherwise it may run off centre.

Piston. The operations here are fairly straightforward except for drilling the gudgeon pin hole. The inside is drilled and bored and as the outside is turned to within 10 thou. when the job is marked and taken out of the chuck. It is then mounted on the vertical slide or clamped by some means onto the cross slide so that drills held in the chuck pass through perpendicularly across the centre line. Alternatively the piston may be mounted on a vee block on a drilling machine or held, on a vee block, onto an angle plate bolted to a lathe face plate. The operation cannot be set up very accurately on a drilling machine which should only be used as a last resort. A vertical slide makes jobs of this sort childs' play. The gudgeon pin hole is finally reamered out such that the pin will not quite pass through and requires a light tap to make it fit.

Milling out the inside for lightening demands a similar setting up technique. The slight increase in performance that this gives is not worth the effort involved if you have no vertical slide attachment.

The piston is now returned to the chuck where it is turned down to within 1½thou. of size, half parted off and lapped to fit the cylinder. This being successfully accomplished it is completely parted off. When fitting pistons to cylinders both parts must be cleaned well to remove grit, enabling an accurate estimate of the interference to be made. Tallow is very useful in preventing the parts from sticking when close fits are being obtained. The correct fit is such that, with tallow the parts will pass fairly freely. They will then feel a little stiff when lubricated with fuel.

Contra Piston. This is easily catered for by allowing some excess length when turning the piston, that is only partially lapped when fitting the latter component. The contra piston is merely parted off at the position which gives the best fit.

Jet Assembly. The screw cap for the needle is made first. The needle is best made from 18 s.w.g. wire finely tapered by careful filing and finished with emery cloth. It is very easy to distort the spray bar when threading and drilling. The hole is finished with a piece of 18 s.w.g. wire sharpened to a point like a screwdriver. Solder the needle very securely to the screw cap. To make the needle a firm fit in the spray bar it can either be bent slightly so that it binds in the spray bar hole, or it can be soldered out of line so that the threads rub a little. There is then no need to go to the trouble of making a saw cut in the screw cap for tightening purposes. 2 s.w.g. wire is suitable for drilling the jet hole on 2½ c.c. engines.

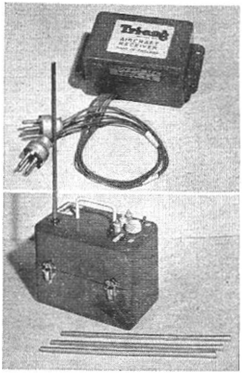
Driving Disc. This is simple turning. The taper which fits onto the crankshaft should be done if possible with the same setting on the top slide as was used for turning the crankshaft taper. Serrations are easily applied by winding across the driving face a boring tool set to make grooves. After each groove is made the chuck is rotated a fraction by hand.

Any other parts such as carburettor intakes, spinners, rotary discs, etc., are simple and require no comment.

Trade Notes

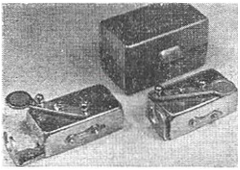
ADVANCE information on the latest in radio control, comes from the unexpected source of **Lines Bros., Ltd.,** well-known to aeromodellers through the associate company, International Model Aircraft. As the photographs show, this is definitely a de-luxe effort which will be in the shops in approximately two months' time. Known as the **"Triang Radio Master"**, the transmitter uses a single 3D6 valve, has a built-in absorbtion wavemeter, *and* incorporates an electronic pulsing circuit. Price for this, believe it or not, is only £6 6s.!

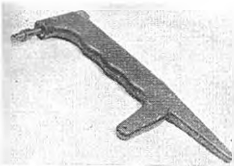
The **"Triang Aircraft Receiver"** is of the super-regenerative type, with separate quench coils. It uses a hard valve of the sub-miniature type (DL68), operates on 60 volts



H/T and gives a current change of 1¼ m/a's. Plessey Printed Wiring removes the troubles of broken connections, and a double pole polarised relay of 7,000 ohms resistance is included in the hermetically sealed case. This relay, which will be available as a separate item, has a double armature so that two sets of contacts can be used. So confident are the manufacturers of reliability, that no external relay adjustment is provided. Receiver complete retails at £3 17s. 6d., and a further combination of receiver plus servo gear for boat enthusiast costs £5 18s. 9d.

Eddie Keil hastens to inform us that last month's inference regarding spark coil supply is off the beam. Three KK coils are available, one of them with special tabs and designed for electronic flash units, price being 17s. 6d. for the standard coils and 18s. 6d. for the super Kracker. All are minimum battery drain, hot spark type with an efficiency rating higher than normal. The famous **Autoknips** timer, only one to achieve 100% reliability in recent tests, is now made with a light alloy body and weighs exactly 1 ounce instead of 1.16 ounces. It is available from all photographic shops through Messrs. Photax (London), Ltd., retailing at 26s. 10d. and for those who want to be certain of getting a full engine run, we thoroughly commend it.





New Davies-Charlton c/l handle.

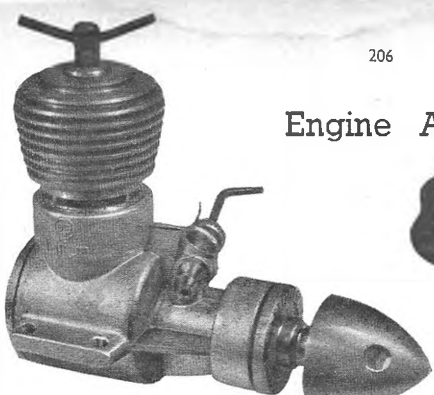
High gloss and absolute resistance to all fuels, including our most potent Nitro Methane mix, is the report we have for **Aero-Glas,** new finish by Hamilton Color Craft, Ltd. Quick to dry, it has the advantage that dope can be applied over it in the event of a repair, and it is a one-part mixture with nothing to add. The surface underneath has to be dead smooth for best effect—the high-gloss being of the type that reveals any irregularity.

Super detailed solid kits—a common claim by most manufacturers these days: but regrettably untrue in a number of cases. One range that does fully justify the title is that of **Avian** by Minikscale Ltd., of Liverpool. Differing in that they are to 1/48th scale, they also excel in having plastic moulded accessories (also available separately) a moulded pilot, card templates, really authentic transfers, and an impressive plan. We are building their Albatross D.111 and S.E.5A and are getting a great deal of pleasure out of working with such a convenient scale and such good material.

Did you miss Farnborough? ? ? A stereoscopic slide viewer by **Eazy-Cee** of Ilfracombe, includes an eight-view strip of the Air Show in colour. Two slides and the smart viewer are sold at 19s. 6d. post free. Scenic travel slides in the range at

4s. 6d. each make quite a library.

A bird whispers that a simple, yet completely accurate approach to the timer tank is on its way from **Henry J. Nicholls.** to be made in light alloy and sold at less than 7s. 6d., it sounds like something to add to the already successful series of Mercury "firsts". Henry's **"Mac"** Class A racer kit with its top quality wood, superb cutting and spindled upper fuselage is outstanding at 17s. 6d. To comply with F.A.I. regs, we calculate that a trailing edge strip 3 cm. wide over the whole span will bring it up to 8.04 sq. dm. and still not spoil the racy lines.



Engine Analysis Number 10

Taifun

1cc HOBBY
and
2·5cc TORNADO

Reviewed by
R. H. Warring

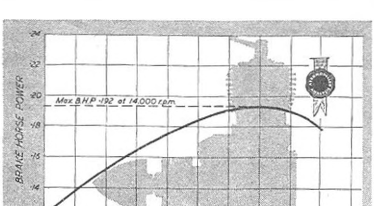
AIMED AT THE world market, these German diesels have been well publicised, particularly in the United States and South America. Separate leaflets are included with each motor, printed in German and English and the instruction booklet is printed in four languages. Models received for test were the .98 c.c. "Hobby" and the 2.47 c.c. "Tornado."

Since their introduction in late 1952, numerous *Taifun* models have appeared in 1 c.c., 2.5 c.c. and 3.5 c.c. sizes. Current models appear to be standardised around crankshaft induction, with plain bearings for the small model and ballraces for the larger models.

Both the test engines were essentially similar in design and construction (apart from the bearings), the needle valve and spray bar unit being common. Production was of the highest quality, from the particularly clean pressure die-cast crankcase unit to accurate machining throughout. Design is essentially orthodox with circumferential porting and relatively shallow exhaust ports, angled needle valve and cast-in beam mounts. On both motors the propeller driving disc is bossed, calling for a ⅜ in. diameter hole in the propeller, whilst the propeller is locked in place by a spinner rather than a nut and washer. The friction face on the "Hobby" appeared adequate for propeller locking, but in the case of the larger "Tornado" it was virtually impossible to tighten up properly on plastic propellers. Actually, the propeller disc on the "Tornado" was cracked, as received, which further aggravated this problem.

Both engines are nicely compact units, although the crankcase on the 2.5 c.c. "Tornado" does appear rather large. Even allowing for the rear ballrace and the $\frac{1}{16}$ in. deep back cover, crankcase volume is still considerable. The chromium-nickel steel cylinder appears to be screwed in into the crankcase casting "for keeps". A copper gasket is fitted between the bottom of the cylinder and the crankcase unit.

The piston, in both engines, is cast iron and the contra-piston nickel-chrome steel. Connecting rod, dural. The crankshaft web is cut away to a greater extent than in most engines and quite highly polished. The hole through the crankshaft which provides the fuel entry is taken forwards well past the actual port, presumably in an effort to lighten this relatively heavy unit. Weight of the 1 c.c. "Hobby" is reasonably low at 2 ounces, that of the 2.5 c.c. "Tornado" being higher at 5 ounces due to the ballraces.



Data:

TAIFUN "TORNADO"

Displacement: 2.47 c.c. (0.15 cu. in.)
Bore: 0.59 in.
Stroke: 0.59 in.
Bore/stroke ratio: 1.07
Bare weight: 5 ounces
Max. B.H.P.: .192 at 14,000 r.p.m.
Power rating: .078 B.H.P. per c.c.
Power/weight ratio: .038 B.H.P. per ounce

Material specification:
Crankcase: die-cast light alloy
Cylinder: nickel-chrome steel
Piston: cast iron
Contra-piston: nickel-chrome steel
Crankshaft: alloy steel
Con. rod: dural.
Bearings: two ball races

Manufacturers:
Johannes Graupner, Kirchheim-Teck (Germany

Propeller—r.p.m. figures

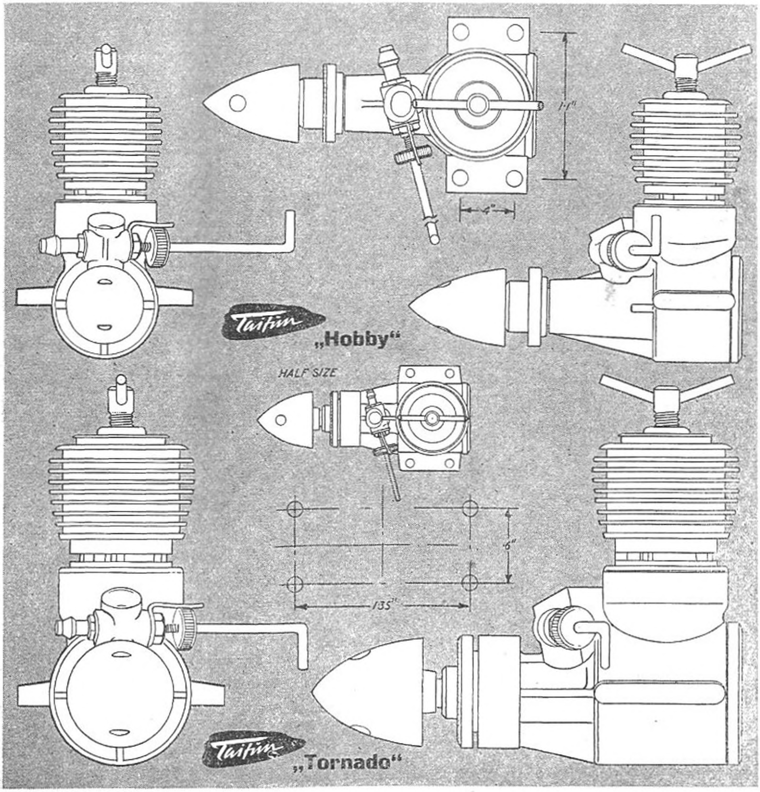
Propeller dia. pitch		*r.p.m.*	*Propeller dia. pitch*		*r.p.m.*
11 x 5 (Stant)	...	6,000	9 x 6 (Trucut)	...	8,200
9 x 4 (Stant)	...	10,000	7 x 6 (Stant)	...	12,000
21 x 15 cm.	...	11,500			

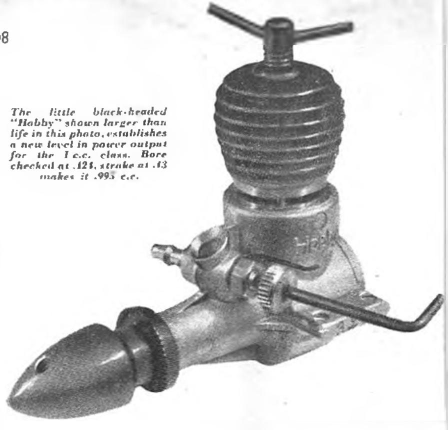
Fuel: equal parts ether, paraffin and castor oil

The "Hobby" proved a delightful power unit—right from the moment of first starting. On the larger propeller sizes it could be started each time after two or three finger chokes, was very consistent and extremely flexible on the controls. Normal running position for the needle valve is as much as six turns open. The control seemed very fine and, unless closed several turns and left, or opened right out produced relatively little response. Compression control was equally flexible, it being possible to increase half a turn from the best running position before rough running was apparent, and somewhat less than a quarter turn down for "missing." Slow running could be produced with any propeller load, simply by opening up the needle valve. Both controls were easy to reach, the compression control being especially comfortable to handle.

For positive starting, the "Hobby" seemed to like the needle valve setting a little on the rich side. With small diameter propellers, priming through the exhaust proved better than finger choking. The cylinder jacket did not get unduly hot, even after prolonged running, nor did jacket, cylinder or crankcase back cover show any tendency to work loose under vibration. Vibration level, in any case, was quite low.

Despite the fact that the "Hobby" is a plain bearing engine, and was probably still not completely run-in at the conclusion of the tests, it appears to be quite a high-speed and *exceptionally* powerful engine. No torque figures were taken below 6,000 r.p.m., at which some tendency towards erratic running was apparent. But on small propellers it would readily speed up to r.p.m. figures in excess of 14,000 and maintain a steady,





The little black-headed "Hobby" shown larger than life in this photo, establishes a new level in power output for the 1 c.c. class. Bore checked at .424, stroke at .43 makes it .995 c.c.

consistent note for as long as wanted. A minimum running speed of 8,000 r.p.m. is recommended, corresponding to a maximum propeller size of about 8 by 4. For really high operating speed, a free flight propeller of 2½ in. pitch, or a control line propeller of 5 in. pitch could be trimmed to diameter size to correspond to peak r.p.m. in the air, or approximately 12,500 r.p.m. static running. The maker's claim of an output of .14 h.p. and a speed of 17,000 r.p.m. appears a little on the optimistic side, particularly the former. The "Hobby" would certainly reach 17,000 r.p.m., but the propeller load to do it would be pretty small.

Propeller sizes recommended by the makers are 6½ by 4 or 6 by 4 for free flight, well-finished samples of these being supplied with the engine. These gave approximately 12,000 and 13,000 r.p.m., respectively on test. The same sizes would also appear suitable for control line work, or even a 6 by 6—a 7 by 3 propeller might possibly prove a better solution for free-flight duration.

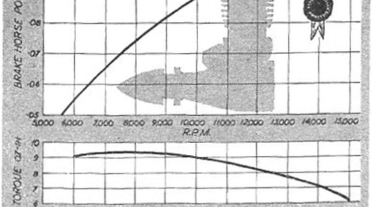
Our experiences with the larger "Tornado" were less happy. In spite of the crankshaft being carried on ball bearings, the engine was definitely stiff when turned over, a stiffness which persisted after some twenty minutes initial running-in and was still suspect later on. Presumably this was in the piston-cylinder fit, set up very tight initially and needing a considerable amount of running to wear down to an easy running fit.

From the handling point of view, the contra-piston was almost frozen in the cylinder—so stiff that it was almost impossible to adjust once the engine had been running for more than a few minutes. The "Tornado" also appeared rather choosey about the fuel on which it would run consistently. Tried on Mercury No. 8, on which the "Hobby" performed admirably, it persisted in missing, which could not be ironed out by increasing the compression. This could be taken up to the point where the engine laboured to a stop, with "missing" persisting all the time. Stale fuel was suspected, but a fresh bottle produced similar results. Test runs were made on a fuel consisting of equal parts ether, paraffin and castor oil, as specified by the makers.

Frankly, short of removing and relieving the contra-piston, it was impossible to secure precise adjustments for this engine. Since there was not time available to do this job, the resulting torque curve obtained must be regarded as not necessarily the best that this engine can produce. Its other characteristics were more favourable, and starting characteristics generally excellent, even with small propellers. It is practically essential, however, to locate the fuel tank roughly on a level with the spray bar to maintain the fuel line full when flicking over. Generous finger choking is then adequate prime for starting.

Summarising, the "Hobby" was a pleasure to handle and test with outstanding performance characteristics for its size. Our impressions of the "Tornado" are somewhat prejudiced by the two unfortunate factors which made it difficult to handle. Yet, basically, there is no reason why it should not be just as nice an engine as its smaller brother, with an improved power potential due to the ball race mounting on the crankshaft. Possibly it is a little under-developed and could be improved in one or two details—certainly as regards contra-piston fit (although this may have been a peculiarity of just the one engine), and a better friction face on the propeller driving disc.

Both engines are boxed, incidentally, with a hardwood test stand for running-in purposes, cut out ready to receive the engine. This stand is intended for clamping or screwing to a bench. The idea seems good but why, we wonder, did they not also drill these stands ready to take the engine bolts? But *full marks* for the neoprene fuel tubing supplied with the engines, a tommy bar for the spinner nut, and the well finished matching propellers.



Data:

TAIFUN "HOBBY"

Fuel: Mercury No. 8
Displacement: 0.98 c.c. (0.06 cu. in.)
Bore: 0.42 in. Stroke: 0.43 in.
Bore/stroke ratio: 1.0 Bare weight: 2¼ ounces
Max. B.H.P.: .10 at 13,400 Power rating: .1 B.H.P. per c.c.
Power/weight ratio: .047 B.H.P. per ounce

Specification:
Crankcase: die-cast light alloy
Cylinder: nickel-chrome steel
Piston: cast iron
Contra-piston: nickel-chrome steel
Crankshaft: alloy steel
Con. rod: dural
Crankshaft bearing: plain

Manufacturers:
Johannes Graupner, Kirchheim-Teck (Germany)

Propeller—r.p.m. figures

Propeller dia. pitch	*r.p.m.*	*Propeller dia. pitch*	*r.p.m.*
8 x 4 (Stant)	8,450	7 x 6 (Stant)	9,400
7½ x 4 (Trucut)	10,700	6½ x 6 (Stant)	12,600
6 x 3 (Stant)	14,000	17 x 10 cm.	12,350
15 x 10 cm.	13,150		

Especially for the Beginner

Test flying—by Rev. F. Callon

BUILDING AND COVERING a glider even as small as the CADET calls for a lot of patient and careful work, as you have probably found out by now. Perhaps you have made a good job of it, and are quite rightly feeling as proud as Punch. But if you took it out now and tried to fly it just as it is, the chances are about twenty to one that your carefully made CADET would twist, turn, dive and stall—in fact do everything except fly. And the fault would be yours, not the model's. You would have forgotten something which is vitally important.

Wot, No Pilot?

As everybody knows, flying a plane largely consists in counteracting any tendency which may develop towards stalling, turning or diving by adjusting the ailerons, rudder, engine speed etc., And your job as non-flying pilot of the CADET is to make all the necessary checks and adjustments *before* the model takes to the air, so that in flight it will be able by itself and automatically to meet any emergency and counteract any dangerous tendency that may arise. The designer has provided you with a model that is capable of doing this if properly trimmed for flight; but the last word rests with you, the pilot.

Final Check

Put the wing and tail units in place on the fuselage and secure them with rubber bands. The bands should be thin, with enough of them to keep the wing and tailplane firm when the fuselage is given a sharp twisting movement. Two for the T.P. and four for the wing (cross-wise between the dowels) should be sufficient.

To check for warps, hold the model as shown in *Fig.* 1 and sight down the fuselage so that the underside of the tailplane is in a dead straight line with the eyes. *Fig.* 2 gives a rough idea of what you should see: wing and T.P. sitting square on to the fuselage, and the T.E. of the wing appearing just below the L.E. and parallel to it right along from the centre to the tips in both directions. If the L.E. and T.E. are not parallel, *i.e.* if they get closer together or further apart at any point, then the wing is warped. In this case remove the wing from the fuselage, twist the warped portion the opposite way to the warp, and hold it like that for a few seconds before a hot fire—preferably an electric or gas radiator. As soon as it is warmed remove it from the source of heat but continue to hold it in the counteracting twisted position for a few more seconds until it has cooled. The warp should now have vanished.

Centre of Gravity

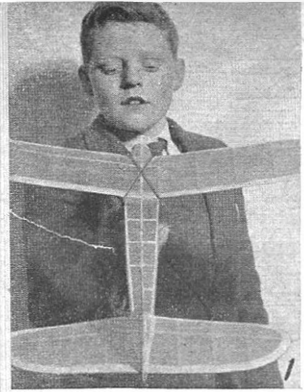
Unless the model balances correctly (usually at a point roughly one-third of the wing chord back from the L.E.) it will not glide properly. You can find out where the c. of g. is at present by balancing the model on the tips of your two first fingers placed under the wing, one on each side of the fuselage. It will probably be somewhere near the T.E. at the moment, so it will have to be moved further forward. This is done by adding weight (small pieces of lead) to the weight box at the nose.

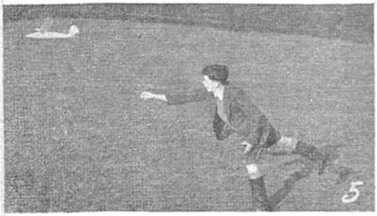
Test Gliding

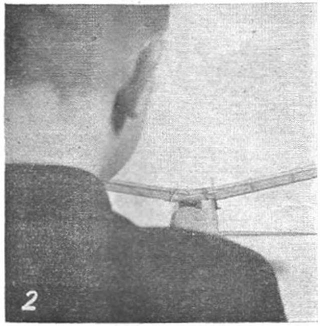
And now at last we are ready to see what the CADET will do in the air. Flying tests must take place on a very calm day—no wind at all, or the merest suggestion of a breeze. You see, the object of test gliding is to find out the correct balance and trim needed to give the model a slow, level glide; sudden gusts of wind would toss it about all over the place so that its true mode of flight could never be studied. Also, relative to its size, a stiff breeze is just about as dangerous to a small model as a gale would be to a full-sized plane, and would probably mean an accident.

Hold the model by the fuselage below the T.E. of the wing at about head height, face directly into whatever breeze there may be, and gently push the model forward on an even keel or with the nose pointing very slightly downwards. You can only find out what is meant by "gently" by actual experiment. The speed at which you launch the model should be precisely the same as its normal gliding speed, but you can't be expected to know this until you have seen the model gliding. One thing is certain: it is better to err on the slow side if anything, so don't *throw* the model forward like a dart.

Fig. 3 shows a typical "first ever" launch. It is level enough but too slow, so that the model never reaches its true flying speed. It "pauses" in the air (this is called "stalling"), drops its nose, and dives down to the ground. The launching speed must be slightly faster, therefore; but not quite as fast as







1. How to hold the model when checking for warps in the flying surfaces. 2. When viewed like this, the Tailplane should appear quite flat in line with the eyes, and the L.E. of the wing should appear slightly above the T.E. and parallel to it. 3. A test glide that is too slow. The model never reaches its true flying speed, and is here seen about to stall. 4. Too fast this time. It is climbing up, losing speed all the time until finally it will stall again. 5. More or less correct. A smooth, level glide which should take the model fifteen or twenty yards before it touches gently down

Fig. 4, where the model is shooting up towards another stall and dive.

On the ideal test glide, the model should never rise higher than the level at which it left your hand, but should glide smoothly forward, gradually losing height until it touches down some forty feet away. *Fig.* 5 shows another attempt, and a much better one. It is still slightly too fast, since the model has risen slightly—though not steeply enough to cause a stall.

If you find that the model always stalls, whatever the launching speed, then more weight must be put into the weight box. Add the weight a little at a time with another test glide after each addition until an almost level glide is obtained. If the nose is too heavy the model sinks rapidly down to earth with much too short a glide. The remedy here of course is to remove some of the weight, once again only a little at a time, until the fault is cured.

The Towline

There must be very few people who have not at one time or another taken up a kite on a line. The principle of towing up a glider is very much the same, except that in this case the "kite" has to be freed from the line once it gets well up in the air. *Fig.* 6 shows the simple device by which the towline is cast off from the model. Ordinary white cotton will do very well for towing up the CADET: cotton, because it is light and strong enough, and white cotton because it is easy to see on the ground. Two hundred feet will be sufficient to start with.

To the end of the towline is tied a small wire ring; the one in *Fig.* 6 was bent out of a wire paper clip. Then, about six inches away from the ring, a small tuft of tissue paper or thin silk is tied to the line. We'll see how it works in a minute. The rest of the line can be wound round a stick or bobbin, but better than either is a small fishing reel mounted on a short piece of wood.

Towline Launching

The model has already been trimmed for a smooth, straight glide; but if it is not going to make a bee-line for the horizon when launched high up, we will have to make it fly in circles. So off-set the fin very slightly either to right or left ($\frac{1}{16}$ of an inch or so) and adjust the setting until a very gentle right or left glide follows each hand launch.

We will suppose there is a nice steady breeze blowing. You will now need the assistance of a friend to hold the model, for it takes two to launch a glider. And don't forget some spare rubber bands and a little box of lead shot in case the weight needs adjusting; it shouldn't do, but you never know. Choose the biggest open space available, well away from trees and houses. Your helper should hold the model as shown in *Fig.* 7, with the nose pointing well up to make sure that the wind gets right underneath the wing.

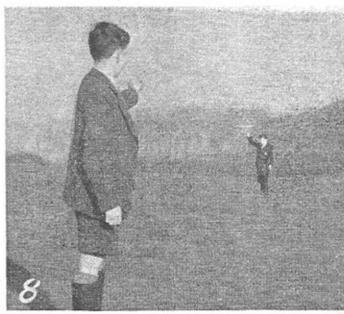
Now unwind about a hundred feet of cotton—that's about one and a half cricket pitches—and take up your position relative to your assistant as shown in *Fig.* 8, making sure that the breeze is blowing directly from you to him right down the line. Wait till you feel a steady patch of breeze, allow a couple of seconds for it to reach the model, and then start to move away into the wind as the assistant lets the model be drawn upwards and out of his hand. Strict timing and co-operation between launcher and helper are essential here. If the assistant releases the model too soon or tends to *throw* it forward, the ring will slip off the towhook. On the other hand he must not hang on too long, or the affair will develop into a tug of war between the pair of you. On a pre-arranged signal from you—perhaps a shouted "One . . . . Two . . . . Three . . . . Go!"—he will start to move forward as you move away, holding the model with the nose well up until he feels it start to lift out of his hands and go (we hope) up and away. Good launching calls for plenty of practice at both ends of the line.

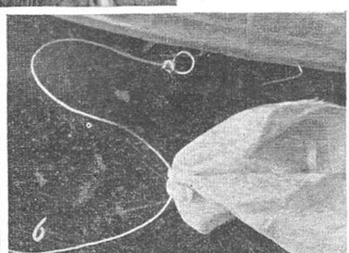
To treat this subject properly would call for a lot more space than we have here, but the following brief notes may help. The ideal model with the ideal strength of wind would go straight up, quite slowly and steadily, without your needing to move at all; but such gliders are few and far between. With a model as small as the CADET you will have to do a spot of running, and at the same time keep an eye open for zig-zags as it goes up. Never turn your back on a model which you are towing—cf. *Fig.* 9—but keep looking over your shoulder as you run to see how it is behaving, as in *Fig.* 10. If it swings from side to side, slow up slightly. If it dives persistently over to one side, head off in the direction opposite to that taken by the model. If it still persists, you have probably got too much turn on the fin, so lessen it or try the opposite turn. If the model refuses to climb at all, this will be due to the fact that either you are not running fast enough, or there is not sufficient breeze, or that the ring should be hooked on further back down the fuselage. If you are already using the back hook, it may be necessary, as a last resort, to build another hook onto the model half an inch or so behind the existing rear one. But a quicker way of putting things right—though some modellers would frown on the method—is to bring the c. of g. forward by adding a little weight, and counteract the bad effect this has on the glide by packing up the L.E. of the wing with a piece of $\frac{1}{16}$" scrap balsa. This will call for more test glides and then more experiments on the line until the correct trim is reached.

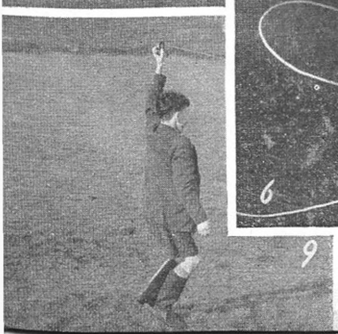
The Actual Launching

When the model has climbed as high as the length of line will allow, the ring must be detached from the tow-hook. This is done simply by slackening the line. Move your end of the line towards the model, and the breeze will catch the tuft of tissue and swing it back and under the model, thus pulling the ring off the hook and freeing the CADET for its first real flight.

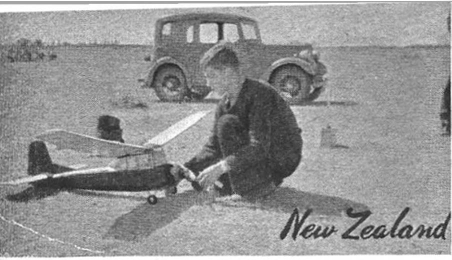
Here's hoping it's a record breaker!

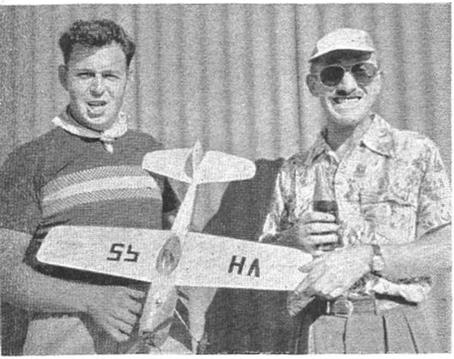


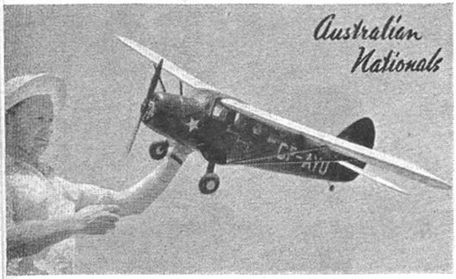




6. Wire ring and tuft of lightweight silk on the end of the white cotton towline. 7. How the assistant should hold the model for towing up. Note the marked way in which the nose is pointed upwards. 8. All ready for the great moment, with the breeze blowing straight down the line from the launcher to his assistant. 9. How NOT to tow up a glider. Running backwards can very often result in the launcher ending up flat on his back! 10. As you move forward, always keep looking over your shoulder like this, so as to be able to adapt your movements to the behaviour of the model







WORLD NEWS

MOST POPULAR British achievement of 1954 with the World's model press was undoubtedly the radio-controlled crossing of the channel by the E.D./Junior Express model. Featured in detail in American and French publications, the epic flight also caught the fancy of **Czech** Editors, resulting in a 7¼ × 8½ in. tone drawing on the cover of their February issue of *Letecky modelar*. The Radio Queen as depicted bears some resemblance to Soviet record holders but otherwise full credit is given to the E.D. achievement. Same magazine also analises the three '54 World Championship winners and draws the comparison of performance with winners at the Moscow meeting (reported, December 54 issue). True merits of East and West will only be known when they compete in the same event and such appears to be possible if the Czechs attend at the Brunswick A/2 finals, only a few miles outside of Russian occupied Germany. The Soviet States MMS meeting is to take place in Czechoslovakia during early August.

Considerable space is given to aeromodelling in *Tribuna da Aviacao*, published in Rio de Janeiro, **Brazil.** Quoting the example of the Argentine as a South American Nation with high International repute, the Brazilian editorial pleads for incentive, and formation of a Brazilian Aeromodellers Federation so that the country can progress into the International contest sphere. Main interest at the moment appears to be control-line.

In colder climates, the Finns held their winter events on an ice covered bay outside Helsinki, **Finland** on February 6th. Due to an uncommonly high temperature, there was an inch of slush over the ice, and only the sufficiently doped models survived. In dead air, J. Jarvi totalled 7 : 24 in three flights to win power, and P. Huhtinen made 6 : 46 to win the A/2 contest. Over July 22-24 this year, the Suomen Ilmailaliitto—Finland's Flygforbund celebrates its 20th anniversary with festivities and International free-flight competitions—and intending English speaking visitors are welcome to contact our correspondent who will help as guide and arrange accommodation. Write c/o World News.

From **Japan** we have the latest catalogue of one of Tokyo's model shops and it's enough to make anyone drool with envy. On our reckoning, there are at least 32 different motors of modern design on their market, 6 of them diesels. One can buy a pre-fab kit for either MiG 15, Sabre or Thunderjet

Top: 5-ft. version of APS Debutante has DC350 and ECC radio, built by 15-year-old Bill Ward of Christchurch. Next, Australian Champ Ron Morrison at left, with K& B 29 winning racer and pilot Len Buck at Australian Nationals. Ron entered 19 events with 15 models. Next: Scale winner Ken de Bomford and BH Amco Norseman. Bottom: Max Newnham and Monty Tyrrell were 1 and 2 in C/L scale. Britannia has four Sabre 5 c.c.

Taken same day, these pictures show flying on ice in Finland and barefoot on dust in Burma. J. Jarvi won at Helsinki and Mg Tun Tin at right lost his Frog Zephyr. Note the "Longyi" on watcher above

to take the O.S. pulse jet which is sensibly sold complete with vibrator coil for starting, or if you prefer big stuff, there's the B.29 or Douglas DC6B.

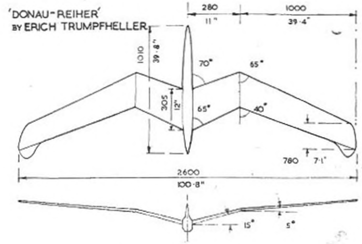
The Tiger-Rockety has a distinct likeness to the Jetex 50, and a timer under the name of ED is as near to an Elmic as one can get. Some of the engines too have a family likeness to the E.D. Bee, McCoys, etc.: but if not original in that direction, the Japs are at least ahead in scale-type combat flying.

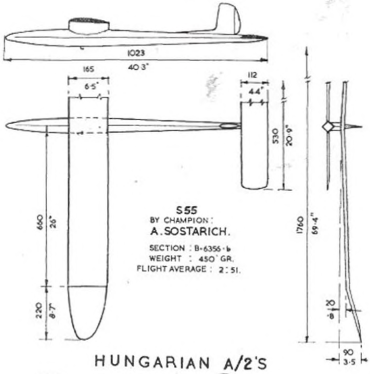
The Max OS 35 glowplug engine is widely used for Spitfirish flapped stunters complete with cabin a la Supermarine. The Zero, Fairey Firefly, Tony and Judy are other types built with enlarged wing and tail surfaces for combat and smartly camouflaged to add authenticity.

210 contestants went to the Seventh National Championships at Rukuhia Airfield, Hamilton, **New Zealand** over the new year. Though strong winds swept the country, Hamilton was sheltered for calm morning contests and flying, except F.A.I. power, was to high standard. The N.Z. Wakefield team is B. McElwain, A. Leong, J. Upton (4th last year) and L. Ackroyd. Models are orthodox but nearly all use small tip fins. In scale c/l, the winning Fokker Trimotor was a replica of Sir Charles Kingsford-Smith's pioneering "Southern Cross". Internal detail was included on the advice of Mr. John Stanidge one of the surviving crew members from those early flights, and his letters and sketches were submitted, together with plans as a guarantee of accuracy. That's scale modelling!

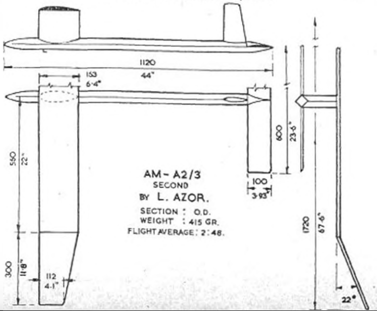
Of paramount importance, the Director of Civil Aviation, Mr. E. A. Gibson, travelled from Wellington to open the Nationals and spoke about the desirability, from the aviation industry's point of view, of a strong aeromodelling movement. He stayed two days to watch contestants in action, and saw several big free-flight classes being flown over the airfield with no conflict between model aeroplanes, scheduled airlines, aero-club flying, glider towing, and top-dressing and crop-dusting aeroplanes. His comments about the airfield discipline of the modellers augur well for our chances of being welcome, very shortly, to fly our models at many of the municipal airfields throughout New Zealand. Interest and practical support such as this is most encouraging to those who work hard to make the modelling movement grow.

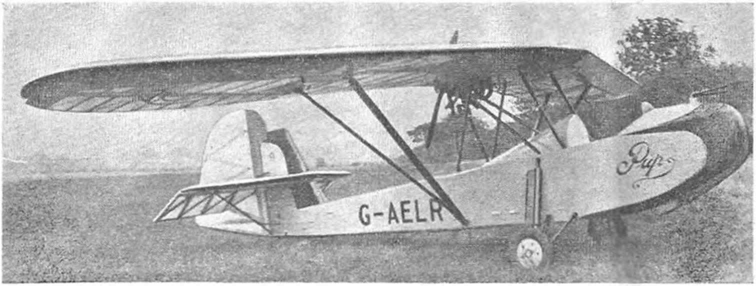
Three gliders of note at right are unique German Tailless and top Hungarian A/2's—note the 5-flight average times from 50m lines





HUNGARIAN A/2'S





The Pup with Ava engine after the fitting of the large balanced rudder and taller undercarriage. At foot of opposite page the Pup is seen in its original form with the low rudder. (Photos by Courtesy of A. R. Weyl.)

AIRCRAFT DESCRIBED
Number 47
BY G. A. CULL

The DART PUP

IN 1935 it was suggested at the London Gliding Club's Dunstable H.Q. that the Falcon III glider plus a small engine, might make a good ultra-light "pusher". A. R. Weyl, A.F.R.Ae.S., of the nearby firm Zander and Weyl, proceeded with this idea but did the job properly by designing a parasol pusher, first known as the Dunstable Dart. Suitable engines have always been a problem with ultra-lights and a Scott Flying Squirrel was considered, but a new, more powerful version of the French "Ava" was announced, so the design was based on the 34 h.p. expected of the high compression "Ava", a tidy flat-four two-stroke.

The company was re-formed and renamed Dart Aircraft and the pusher became the Dart II or "Pup". The centre-section was mounted above the fuselage and housed the oil tank in its l.e. and the two fuel tanks between the spars. The Ava 4-a00 was mounted aft of the rear spar to which was bolted the adjustable bearers, allowing variation of the thrust line during trials, and there were four supporting struts to the fuselage. The shapely wings were swept-back 15° for stability and this was very suitable for the pusher layout where the forward position of the cockpit is a strong influence on C.G. position: more so with ultra-lights where pilot weight is a substantial proportion of the all-up wt. and the variation between pilots must be catered for. The wings were understandably glider-like and had no internal wire bracing. Ailerons were unbalanced and were push-rod operated by differential arms. The wings had no dihedral and were braced by V-struts attached to the fuselage by hinge-fittings and other pivots at the t.e. of the centre section enabled the wings to be folded back. Aileron controls connected-up automatically when the wings were spread. For transport by road, wings, tailplane and rudder were easily removed. Due to the high thrust line and the necessary up-thrust, the slipstream played onto the tailplane. So variable incidence gear was provided to cope with engine on/off trim changes, but in practice this proved unnecessary as no change trim occured. The undercarriage had brakes and both springing and rebound shocks were taken by rubber compression discs, and a solid tailwheel and nose-skid.

Mr. Weyl made the first flight in July '36 and it became apparent that the Pup was underpowered and a variety of props. and thrust line adjustments were made. Although pleasant to fly, take-off run phenomenally long and absolute ceiling was 2,500 ft. It eventually transpired that the engine was not the 34 h.p. model ordered but had been detuned to 27 h.p.! The makers had not informed Dart Aircraft that the 34 h.p. model had been abandoned due to overheating and its pursuance was discouraged by the French Air Ministry's classification of ultra-lights as aeroplanes with 25 h.p. or less. This "faux pas" by the makers meant that the Ava would never be good enough but further mods. were hopefully made. To improve rudder response in the Ava's mild slipstream a larger rudder was fitted and a taller undercarriage increased the ground angle. However, a complete cure was effected by a trusty 36 h.p. Bristol Cherub III in June '37, but as this engine was out of production, the prototype was the only Pup ever built. In the air the Pup was viceless with a gentle level sink rather than a stall. A faster than usual glide was due to the unclean parasol pusher layout, allied to the above average loading and the NACA 23012 basic airfoil (used in the Auster) which, while giving good speed on low power, lacks max. lift at low speeds. Stability was positive in all three planes and a peculiarity of great virtue was the Pup's ability to land itself without human interference! Today's exponent of this dated achievment is, of course, the otherwise dissimilar H.P. Victor of crescent wing fame.

A month after acquiring the Cherub, the Pup was sold to a Mr. Green who, after having a lot of fun, wrote-off the Pup shortly before the outbreak of war. He failed to clear a hedge while taking-off with full load near Birmingham, and so ended the career of an aeroplane whose future was spoilt for lack of an engine.

Specification:

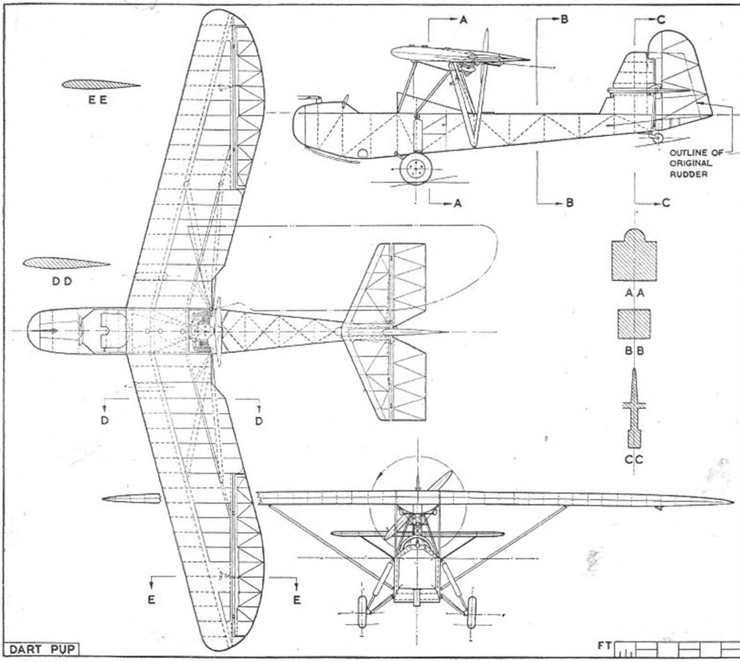
Span: 29 ft. 7¼ in. Length: 19 ft. 8¼ in. Wt. Empty: 485 lb. Loaded Wt.: 705 lb. Wing Area: 114 sq. ft. Wing Loading: 6.18 lb./sq. ft. Max. Speed (Ava): 75 m.p.h. (Cherub): 90 m.p.h. Stalling Speed: 35 m.p.h. Landing Speed: 37-40 m.p.h. Landing Run: 50 yd. Take-off Run (Cherub): 80 yd.

Construction:

All wood with mild steel fittings. All struts of engine mounting, centre section, tailplane, wing and undercarriage of steel tube. Fuselage was ply-covered box with integral fin and detachable rounded alloy nose cap. Tailplane had box spar and ply-covered nose and centre section with cut-out to drop over fin. L.E. of rudder ply covered.

Colour:

All fabric clear doped. All ply covering on fuselage and elsewhere doped cream except for red trimming on nose, leading edges and tips. All struts and lettering in red.



"J" type 1/72nd scale repr ints and "K" type 1/36th scale dye-line prints of this drawing are available from "AEROM ODELLER PLANS SERVICE", price 6d. and 1/. respectively.

CLUB NEWS

WITH THE FIRST of the 1955 S.M.A.E. contests taking place five days after this issue is published, now seems a good opportunity to wish modellers everywhere a good season's flying, with lots of thermals but reliable D.T.'s and—and wouldn't it be a boon!—a nice flat calm on every contest day. It may be some consolation to think that it could hardly be a worse year than last!

H.W. the Mayor examines the O'Heffernan record R/C model at the "Young Plymouth" exhibition

Southern

Good news for those who struggled to get to Larkhill last year is the decision taken at the Area A.G.M. to hold the first three Area contests at Andover. The Area officers elected come from four different clubs, giving good representation over the area.

Tony Brooks kept **GRANGE M.A.C.** well to the fore in the January Epsom meeting, placing second in both the Bill White and the Open Glider. Tony Goodall was also in the Bill White fly-off. Certain members have been seen building new models, but at present there seems little danger of the habit spreading!

An off-shoot of Reading S.M.S., the **ASHMEAD SOLID MODEL SOCIETY**, has been formed at Ashmead School; present membership is around 100 and Neville Duke is President. Activities will include spotting contests, etc., against other schools and groups.

Admiralty building has hampered **GOSPORT M.F.C.** flying, but the club building programme is unabated. Interesting jobs include a 2 : 46 *Senator* (which is suffering from shifting tail trouble), a needle-bodied A2 with a mild steel nose-block, and a Grumman *Guardian*, Fox 35, which D. Tanner anticipates using in the Gold. Wakefield fan R. Carlyle is doing regular maxs., with a 50 in. design using a 20 in. featherer.

Fortunate is **SWINDON M.A.C.**, whose happy co-operation with the local council has brought them the use of certain recreation grounds without the usual difficulties. A solid model in brass caused the Mayor to clutch his chain of office while inspecting a club exhibition; if any club would like details of the recent successful audience-judged foyer display we shall be only too happy to pass on letters to Swindon's sec.

High times in 1954 in **FARNBOROUGH M.A.C.** were D. Gordon's 10 : 52 off 11 in power and J. Howell's 7 : 00 from a short line in glider. Winner of the Contest Cup for a points aggregate throughout the year was J. Webster, with a series of o.d. Javelin-powered models.

At **BOURNEMOUTH M.A.S.**, A.G.M., concern was expressed over the status of S.M.A.E. associate members, especially in respect of the awarding of a National contest to them, which, it was felt, contradicted the idea of introducing this type of membership, and also on the chaos of competition rules and the delay in the publication of a rule book. Domestically, the club is in a sound position, but it is hoped that membership, static at present, will increase this year.

Celebration of **WEST HANTS A.A.**'s winning the Southern Area Rose Bowl for 1954 was tinged with regret that C. A. Rippon was unable to stand for re-election as Chairman for a further term. His place will be filled by S. Taylor, a leading F/F member of the club. Guests from several other clubs added to the enjoyment of the annual dinner and dance, which was considered to be one of the best yet.

North Eastern

A new club in this Area is the **SOUTH SHIELDS AEROMODELLERS**, numbering 26 members but expected to expand rapidly. Meetings are held on Thursday evenings in the basement of the Whitley Model Shop's Laygate branch, where test benches, etc., are available to members.

Permission to fly on the tarmac at R.A.F. Longhenton has been received by **NOVOCASTRIA M.A.S.**, thanks to member Gibson and the S.M.A.E. First '55 contest will be a scramble for the Cockle Shield, and a one-design contest featuring the A.P.S. *Lulu* is scheduled later in the year.

Midland

This is the time of year for A.G.M.'s, and **NORTHAMPTON M.A.C.** also send in a report of theirs. 1954 saw a slight drop in membership and a healthy promotionary drive aimed at juniors is in progress; last year a big swing to sport and scale flying was noticeable, and adding this to the recent publicity on by-laws, the club is now raising the matter of flying in local parks once more—it was banned some five years ago, but possibly, in view of other clubs' experiences, the ban may not hold water.

Returning the film projector and the films is **WALSALL M.A.C.**, whose members have been fortunate in borrowing these for some interesting winter film shows. With the amalgamation of the Flying Saddlers, the membership is quite respectable, and some sharp competition is expected during the year. Greatest interest seems to be centred on V.T.O. power jobs, which are ousting Jetex R.T.P. models.

Indefatigable **WOLVES M.A.C.** member P. Westwood has braved the elements to put up a floatplane record of a modest 42 secs. Waterlogged floats altering the C.G. on his Dart powered model rather wrecked the glide. In the warm, J. Hartley has established a Jetex speed record of 86.0 m.p.h. with a Jetmaster, but times higher than this are difficult to record without an automatic timer. Indoor flying has been extremely popular, but has not interfered with the production of swarms of new models for the outdoor side of things.

Also keeping up interest with indoor activity has been **WEST BROMWICH M.A.C.**, where the fastest engine starting time—35 secs.—is so far a dead heat between a senior and a junior. Attempts at indoor C/L came to a sudden halt when the lines parted half-way through! Lectures have been given on such subjects as radio control, engine maintenance, fuels, etc., and the rest of the winter has been spent in designing and building hotter and hotter models for '55.

Membership of **OUTLAWS (Cannock) M.A.C.** is once more on the upgrade after a slight decline. Now in its tenth year, the club's financial position is very sound, being augmented by a series of Beetle Drives, which sounds to us as if there are some very keen members prepared to do a bit of spade-work for the general benefit of the club.

PETERBOROUGH M.A.C., missing from these columns for a long time, tell us that the club is still going strong, with interest spread over most of the usual spheres. How much some youngsteres need advice is demonstrated by the one who built his fuselage sides by placing the wood in position *after* squirting cement on the plan!

Rising membership is a source of satisfaction to **MONKSPATH M.A.C.** Meetings are on alternate Fridays at Monkspath Vicarage, and permission is being sought for the use of a nearby field for Friday evening flying throughout the summer. The actual flying site is still R.A.F. Honiley, but most activity has been indoors with R.T.P. and tiny chuck gliders. New models by the dozen are awaiting an airing.

North Western

A most successful Winter Rally was held at Tern Hill on Feb. 6th, attended by clubs from all over the Area. Power was won by J. Parrott of Whitefield, 2 maxs. and 1 : 47 (49 entries), Rubber by J. O'Donnell, Whitefield, 3 maxs., (28), and Glider by J. Dutton, Wavertree, 6 : 33 agg., (37).

An excellent A.G.M. and a first-class dinner started 1955 with a swing for **SOUTHPORT M. & E.C.** Models of all types feature in this club and the latest indoor activity is an electric rail-car track. Plans are already in hand for the September exhibition, which will again demonstrate C/L indoors, as well as other modelling.

The **BLACKPOOL & FYLDE M.A.S.** indoor helicopter record has been raised to 1 : 05 by Cliff Davey, using an American design featuring twin contra-rotors and a "Floating" stabiliser dangling on 6 in. of nichrome wire. Outdoors, this flier and clubmate Mike Thomas took advantage of a sunny day to test their rubber jobs; the *lowest* flight returned was 3 : 15, and they're wondering if they can do that in contests! N. Porteous has a helicopter-cum-ornithopter-cum-spinning top, which he proclaims is a contest power job. The club want to know what contest? During the local hobby show, Jetex, rubber, and Bambi powered R.T.P. models were shown in conjunction with a static display; great amusement was caused when someone moved the pole off-centre and a Bambi job wiped off its tip on a barrier—it flew faster, anyway. This show brought in several new members.

A flood of members is also reported by **ALLERTON M.A.E.C.**, after displaying 100 models in a local church hall. The publicity, say the club, was beyond our expectations, and certainly the newspaper cutting sent along was most interesting and accurate. If this inspires your club to think of an exhibition, the two golden rules are let people know it's on and make sure it's no trouble for them to get there.

A new club is **ST. HELENS & DISTRICT (YMCA) M.F.C.**, meeting on Mondays at, needless to say, the Y.M.C.A. The 30 members have room for indoor R.T.P. and their own C/L field, but have to go a little further afield for F/F. Wives and girl friends join in, and a Social and Dance is being held on March 19th to raise funds; later on an exhibition and some contest flying is planned.

WALLASEY M.A.C. finally worked out the 1954 points results, top being J. Hannay, 59.61, 2nd J. Done, 58.65, 3rd S. Hinds, 54.06, and top junior R. Hotchkiss, 29.58. One second and two thirds were gained at Tern Hill, a score marred by J. Done losing one of his perfectly trimmed 1.49 models.

Main success of **WAVERTREE M.F.C.** at

Tern Hill was J. Dutton's win with his stick A2, which uses a very small tail. Much trimming is going on for the postal contest with Czechoslovakia which will be over when these notes appear. Speed is attracting a spot of interest, especially W. Simpson's Dooling 29 job.

London

Appealing for members is **HAYES M.A.C.** (J. Marshall, 43 Keith Rd., Hayes) who, after an unsettled period, are now down to half a dozen keen types. A2, Ltwt. rubber, and F.A.I. power are the main interests, and one outstanding model is J. Babuley's B.B. Elfin design which has been ratioing 30 in cold weather tests.

A team race and combat do is being staged by **HIGH WYCOMBE M.A.C.** on May 1st, at Kings Mead recreation ground, which is about three miles from the town centre towards London (nearest station Loudwater). Combat on 52½ ft. lines, up to 3½ c.c., T/R to 1954 S.M.A.E. rules. Further gen from M. Smith, 23 Roundwood Rd., Sands, High Wycombe.

A "new" group in the Area is the **NORTH KENT NOMADS M.C.**, which is actually an amalgamation of the old North Kent, Kentish Nomads, and S.E. London R/C clubs. Members number 40 and meetings are held at Welling Library.

May 8th is picked for **DARTFORD M.F.C.**'s Annual C/L Rally, which will be held in Dartford Central Park by courtesy of the Council. Normal T/R, combat on 50 ft. lines, up to 5 c.c., 2/6 entry. No flying if you're not insured. Details from K. L. Blanks, 49 Lowfield St., Dartford.

One club who pressed the park flying issue to the limit was **SOUTHGATE D.M.F.C.**, and they eventually defeated the local council. Only twelve months old, the club is in an excellent position and planning an exhibition, a flying display, and a series of club contests. If you'd like to join, pop along to Wood Green recreation ground between 10 and 1 on Sundays.

Active programme of **EPSOM D.M.F.C.** includes lectures and instruction to a school group and to the local W.J.A.C. unit, from which a gain in membership is anticipated. Preparation for the Nationals is afoot, with lots of grooming of tailless and other unorthodox models; scale and sport are also prominent.

The 1955 Croydon Gala will be held by **CROYDON D.M.A.C.** at Chobham Common on May 1st. Contests will be for open rubber, glider, and power, plus slope soaring and chuck glider.

South Western

Participation by **PLYMOUTH M.F.C.** in the town's "Young Plymouth Exhibition" resulted in a crop of 10 new members, mostly juniors. The club's stand was mainly a comprehensive static show, but demonstrations were given from time to time, chiefly of scale Jetex jobs.

Northern

Another club celebrating its first birthday is **SAKERS M.A.C.**, hailing from Middlesbrough. Recent attempts at winter contests have seen a few brave entries, but the weather and extensive building have kept many of the clubmen by the fireside.

A change of name from Grimsby D.M.A.C. to **CLEETHORPES THERMALIERS M.A.C.** is occasioned by the fact that most of the remaining stalwarts are residents of Cleethorpes. The same officers, etc., remain —just the name is changed.

Last month we crossed our typewriter keys and got geographically a little adrift when we said that *Creep* influence had spread to Bradford from Halifax. This model originates, of course, from Leeds' member Brian Eggleston. Several examples have been seen in **BRADFORD M.A.C.**, although *Swiss Miss* still holds pride of place as a vehicle for Torpedo 29s. A pointer to Silvio Lanfranchi's success is that he has several times been seen on Baildon Moor in conditions which kept most of his club-mates huddled over the fire.

The link-up between Bradford and **LEEDS M.F.C.** has now received the assent of the latter club's members. This club will be hitting the T/R circles in a big way this season, and, just to keep their wrists free, three of the more rabid enthusiasts spent an hour or two practising stunt in six inches of snow. Normal damage, plus inducted snow putting the plugs out, terminated the session before the fuel quite froze.

A new club in Sheffield has been formed, the **NORTH SHEFFIELD M.A.C.**, taking in Ecclesfield and Chapeltown etc. Interest is mainly in C/L and lightweights, but any type of aeromod. will receive an enthusiastic welcome.

East Anglian

1955 was off to a shaky start for G. Davie of **NORWICH M.A.C.** when he spiralled his 5-year-old *Junior* 60 in a tree and virtually wrote it off. Team racing is the trend in this club, and an o.d. delta job in this category is being watched with interest. A notable feature on the organisation side is the election of a 16-year-old vice-chairman in the person of C. Sparrow.

Western

Successful negotiations have been concluded by **SOUTH BRISTOL M.A.C.** for a flying site just on the outskirts of Bristol. This is a much more convenient spot; though not large enough for contests, for an odd bit of trimming or sport flying it is a great boon. A third site, for C/L only, is now anticipated. Winter meetings have been well supported, with R.T.P. very popular and the standard of performance quite high.

South Eastern

Looking back at '54 were the member clubs of the East of Medway Modellers' Assoc. (E.M.M.A.) at a well-attended dinner in Herne Bay. Leading club in the season's results was **CANTERBURY PILGRIMS M.F.C.**, whose members also took most of the individual awards. Some really keen competition is expected during the coming months, when the seven or eight clubs in the group start their full programme. F/F is very much to the fore, with C/L getting an occasional look-in. It is hoped that some members of E.M.M.A. will be re-joining the S.M.A.E.

Taking a leaf out of Eastbourne's book(?), over *half* of the **MEN OF KENT AERO-MODELLERS** are taking dancing lessons—to be more photogenic? Bad weather has meant that lots of new models still await trimming, so we suppose that the fellows have to do something! A sally to the Epsom meeting in January met with several spots of bad luck, and the boys are chafing for the start of the season proper.

Scotland

Models are plentiful in **BANFF M.A.C.**, but lack of a flying site and decent weather has so far ruled out any contests. Membership is on the increase, and with summer hurtling on interest has switched from R.T.P. to the club R/C project being built out of club funds.

Biggest item at **WEST OF SCOTLAND** Area A.G.M. was the big P.A.A. meet later in the year. Since it is probable that the U.K. Challenge Match will be flown off during this meeting, plus the 1956 Eliminators, it should be quite a day.

Membership drive is on in **PRESTWICK M.A.C.**, who are anxious to retain the impressive number of laurels won last year. The winter has seen much building going on, and at the first sign of good conditions there'll be some concentrated trimming put in.

CONTEST CALENDAR

Mar. 20		
Gamage Cup	U/R rubber	D/C
Pilcher Cup	U/R glider	
Apr. 3		
S.M.A.E. Cup	2nd A2 Elim.	Area
Farrow Shield	Team rubber	
Women's Challenge Cup	U/R rubber/glider	
Jetex Challenge Cup	Jetex	
Apr. 10		
C/L Speed Elim.		Cent.
Apr. 24		
Weston Cup	2nd Wkfld. Elim.	Area
Astral Trophy	2nd Power Elim.	

Ireland

Also driving for members, **CORK M.A.C.** report initial successes of eight new men. The weekly column obligingly inserted by the local evening paper is most useful to the Sec., who saves himself an awful lot of chasing round thereby. The annual dance was a huge success (though not exactly so financially) and the latest activity is a building/finish/flying comp. of the type described in these columns before. It is expected that this will improve the general standard in the club and ensure a few places in the Munster Championships later in the year.

Those readers handy with a pen will be interested to hear of two young overseas modellers eager to correspond. First is Ove Sonden, Box 411a, Hudiksvall, Sweden, who is primarily an A2 man but likes any F/F or C/L; he is looking for someone around the 15-16 age group. Evan Currie, 12, of 112 Moray Place, Dunedin C.1, Otago, New Zealand, writes a very fair letter, and would like to write a few to someone of between 11-14 keen on C/L, Jetex, or scale rubber.

Which brings us to the end once more.

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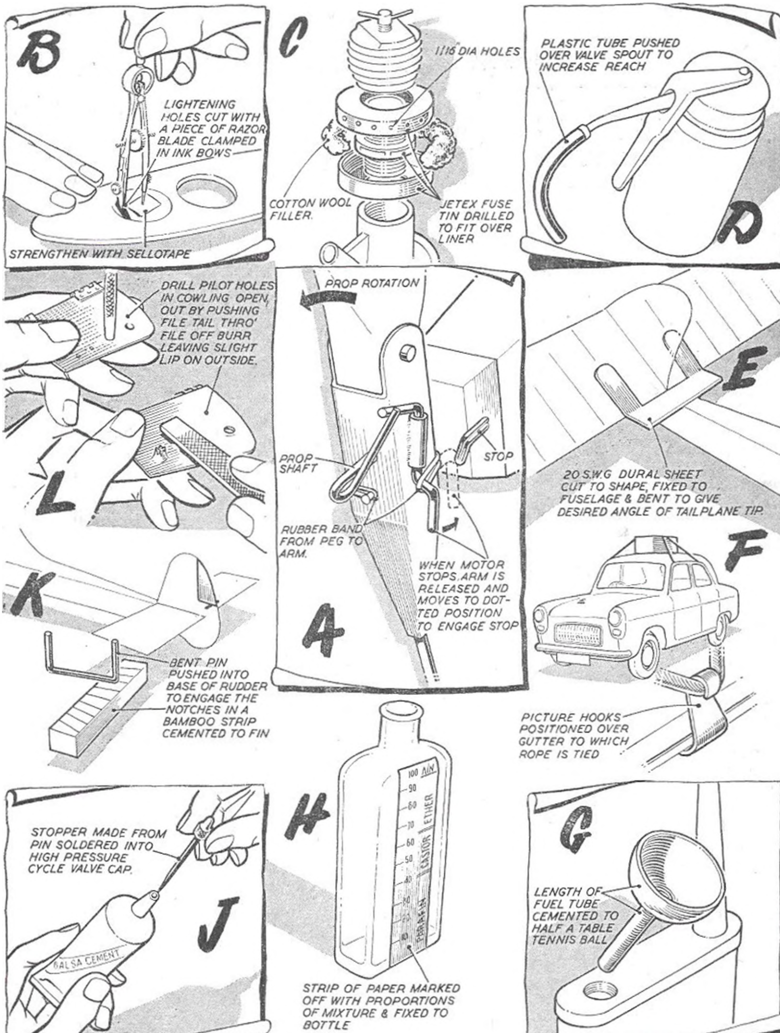
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D
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L
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PROP SHAFT
STOP
RUBBER BAND FROM PEG TO ARM.
WHEN MOTOR STOPS, ARM IS RELEASED AND MOVES TO DOTTED POSITION TO ENGAGE STOP
A
E
20 S.W.G DURAL SHEET CUT TO SHAPE, FIXED TO FUSELAGE & BENT TO GIVE DESIRED ANGLE OF TAILPLANE TIP.
K
BENT PIN PUSHED INTO BASE OF RUDDER TO ENGAGE THE NOTCHES IN A BAMBOO STRIP CEMENTED TO FIN
F
PICTURE HOOKS POSITIONED OVER GUTTER TO WHICH ROPE IS TIED
STOPPER MADE FROM PIN SOLDERED INTO HIGH PRESSURE CYCLE VALVE CAP.
BALSA CEMENT
J
H
ETHER
CASTOR
PARAFIN
STRIP OF PAPER MARKED OFF WITH PROPORTIONS OF MIXTURE & FIXED TO BOTTLE
G
LENGTH OF FUEL TUBE CEMENTED TO HALF A TABLE TENNIS BALL

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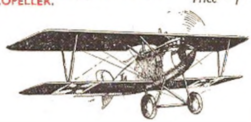

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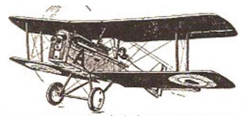

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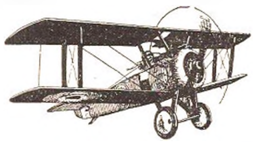

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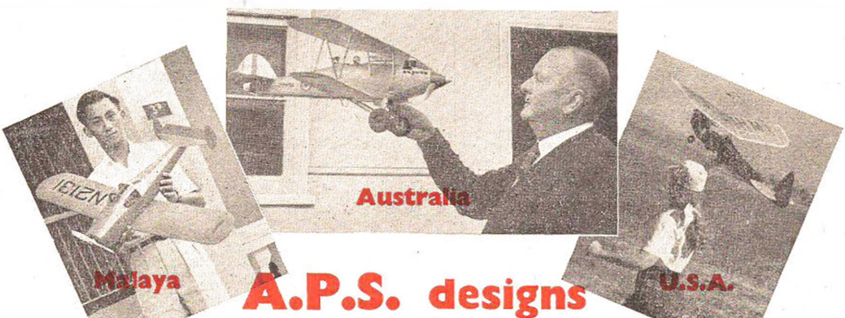

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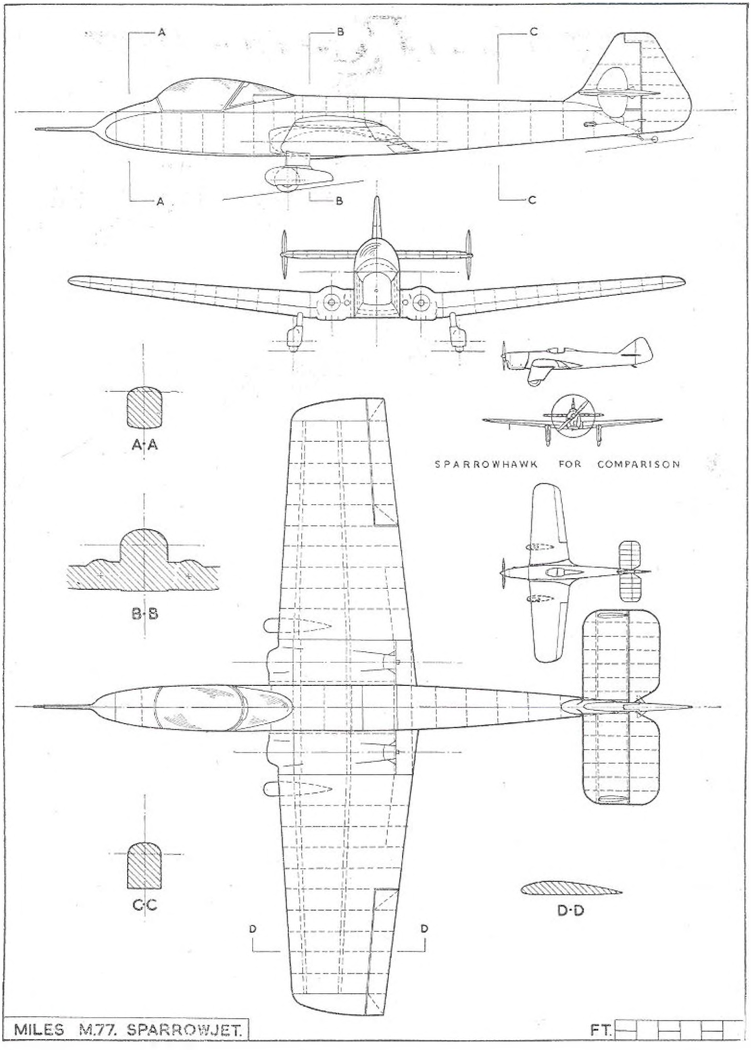

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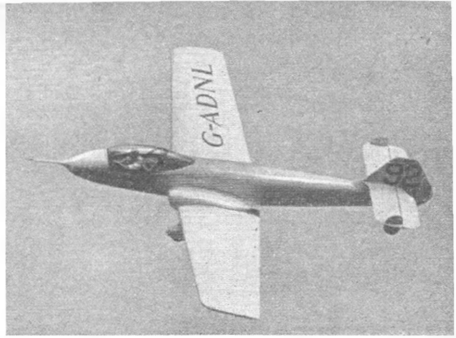


By G. A. CULL

THIS YEAR British air racing received a stimulus in the form of a new aeroplane that is remarkable in more ways than one. In these days when sporting aviation is having a lean time, the building of a new racer seemed out of the question but the Sparrowjet is just this. Furthermore, this is the first British jet lightplane, and twin-engined at that, and is purely a sporting project.

In view of the Sparrowjet's newness, it is strange to reflect that this machine originated back in 1935 but the old registration, G-ADNL, is the only clue to this. 'NL came about as the result of F. G. Miles' decision, two months beforehand, to compete in the King's Cup in a new aeroplane to be concocted for the purpose. Mrs. Miles played a large part in achieving this quick piece of work which mostly consisted of cutting-down standard Hawk components. Wing outer panels were re-married to a fuselage which had been shortened by a couple of feet, and a new low undercarriage was fitted. With a standard tail and high-compression Gipsy Major fed from long range tanks, the outcome was the potent little Miles M.5 Sparrowhawk, 'NL. On the first day of the King's Cup contest which was a circuit of Britain, 'NL was first home at 163.84 m.p.h. In next day's short race 'NL did 172.38 to place eleventh.

After the war 'NL belonged to G.C.M. Alington (least known of the original Throttle Benders) who sold her to F. Dunkerley, also of the T.B. Union. With small French jet engines now on the scene, F. G. Miles undertook the transformation of the old machine into a new jet racer to Dunkerley's requirements, and work commenced at Redhill in early '51. Two Turbomeca Palas of 330 lb. static thrust each were to provide power, but until these were available two of the earlier Pimene engines served for installation work. Engine bays were built close to the fuselage and are all-metal, insulated from the wooden structure by air gaps between metal ribs. The original wing roots pick up onto bridge members which span the engine bays while the new undercarriage legs bolt onto the original front spar. With no prop clearance to cater for the u.c. is short and uses Magister oleo legs and disc-braked wheels are a pair of those made for the American Goodyear racers. The cockpit was moved into the lengthened nose to make good the weight of the discarded engine, and from this position the pilot's view for racing turns round pylons is excellent. The cockpit canopy was made by D.H.'s and hinges up and rearwards. Two extra sections of flap are beneath the engine bays and flaps are now electrically actuated. Because of the higher speeds, all control surfaces are now ply-covered and mass balanced and the two small fins are in fact, nothing more than fairings for the elevator balances. The fuselage has been stiffened by additional vertical runners and the wings are now skinned with thicker (5/64 in.) ply forward of the rear spar, and house larger tanks. First flights were made with unchanged wingtips but alloy tips are now fitted which reduce both aileron and wing span. All this re-tailoring was finished at Shoreham in late '53 and G. H. Miles made the first flight on December 14th.

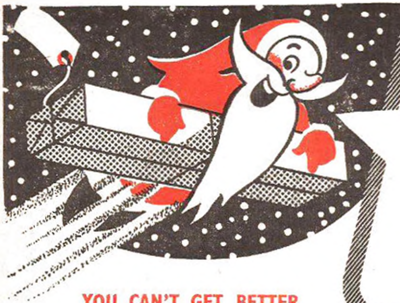
Teething troubles caused the engines to be returned to France for mods. and so the Sparrowjet's debut was delayed until June 18th when she was scratch machine at Bagington in the eliminating race for the King's Cup to be held the next day. After a sprightly practice flight in the morning, tragedy came to Fred Dunkerley on the starting line. To save weight, the engines are started by external 2,000 lb. p.s.i. air bottles, but at the critical moment a blockage in this system prevented a start being made despite great efforts sustained long after the starter's flag had dropped. At Shoreham on August 28th all went well and Dunkerley averaged 210 m.p.h. (5 m.p.h. faster than the Mew Gull in the same race) to place 7th on handicap in the Goodyear Trophy. Later that day in the round-the-aerodrome T.B.U. race, 'NL averaged 185 m.p.h. into 3rd place.

Specification: Span: 27 ft. 8 in. Length (over pitot head): 38 ft. 10 in. Height: 7 ft. 2 in. Wing Area: 156 sq. ft. Empty Weight: 1,578 lb. Loaded Weight: 2,400 lb. Max. cruising speed: 220 m.p.h. at 10,000 ft. Initial climb: 2,100 ft. per min. Rate of climb: 1,400 ft. per min. Stalling Speed: 60 m.p.h.

Construction: All wood excepting engine-bays. Fuselage is a ply box with 4 spruce longerons. Wings have two box spars with ply covering. Tail unit had spruce spars and is wholly ply-covered. Engine bays have detachable alloy cowlings and spars bridge engines. Spars are fabricated; front dural, rear steel. Plates beneath engines act as drag bracing. Oil tanks in L.E. inboard of intakes with cooling air intake leading through middle of tank. Engine cooling air intakes below each engine. 2½ gall. petrol tank (for starting) in decking aft of cockpit 42 gall. kerosene tank in each wing. Wing section is Clark YH modified to 18.8% t/c. ratio at root and 10% at tip.

Colour: Glossy white overall with racing number 92 in black on fin and rudder only. Registration letters are deepest blue and are above star'd wing (20½ in. high letters) and below port wing, and on fuselage sides are 1 ft. high. Roman lettering is used.

The Sparrowjet and the sole remaining Mew Gull have exactly the same colour scheme, being both owned at one time by F. Dunkerley. The use of Roman lettering on the Sparrowjet is very unusual and in the left-hand photo the nose-mounted pressure head is seen without its present fairing. At right, on landing approach, the extra flap sections are visible and neat jet intakes seen at wing roots. Photo of cockpit interior appears in the 1954 "A/M ANNUAL."



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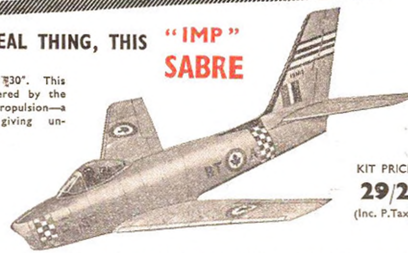

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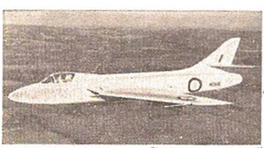

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The New

'AEROMODELLER' TRANSMITTER

BASED ON the original circuit described by Howard Boys in the June, 1952, "AEROMODELLER," this simple unit was designed and built by Ted Sills and the Editor in a matter of a few hours. All the components were purchased over the counter at a well-known model shop including the neat and workmanlike case. All are standard, the only "surplus" items being the Air Ministry pattern 0 to 50 M/a moving coil meter and micro switch, which are, in any event, in plentiful supply throughout the country.

It is emphasised that the prototype is a de luxe version incorporating many refinements that can be omitted if economy is necessary. This unit was, however, deliberately built de luxe, as the author feels that a transmitter is an instrument that should last a lifetime, and consequently worth spending a little time and money over. The B136 Batrymax which combines both H/T and L/T supplies for instance, costs a little more than ordinary batteries, but the plastic 4-pin plug that goes with it is already made up complete with colour coded flex. It certainly makes a neat and efficient job, and being designed for portable radio use, is small in size, thus permitting the construction of a very compact unit.

For those who wish to economise the following suggestions are made: The case can be home built or obtained government surplus: the 0 to 50 M/a meter can be omitted, especially if the builder has an All Purpose Meter as described in the April, 1950 "AEROMODELLER." The leads that at present connect to the meter can then be connected to a polarised two-pin socket, with a shorting plug for when the meter is not connected. A cheaper plastic "on-off" switch can be used, and the micro-switch replaced by a plastic push button switch. The valve screen can be omitted, and the keying choke home built by winding two separate layers of 28 turns each of 22 gauge enamelled wire on a 9/16 inch paxolin tube 2 in. long. The tube should be drilled and slotted for attachment as shown. The Mullard DCC 90 or American type 3A5 valves can sometimes be obtained ex-Government at around 10/- each and there is another surplus valve that can be used, the 3B7/1291. This valve does, however, require a slightly larger valveholder, so the panel must be modified accordingly. It also has eight pins instead of seven, No. 5 not being used.

We are, however, hoping that the reader, after studing the photographs, will be only satisfied with a first-class job, and pass on to a detailed step-by-step description of the prototype. Pausing for a moment to mention that it was tested, using a standard E.C.C. 951A receiver, up to a range of 1 mile, at which distance the receiver was still giving maximum current drop. The receiver was only tuned once, this at close range, and no subsequent adjustments were found necessary.

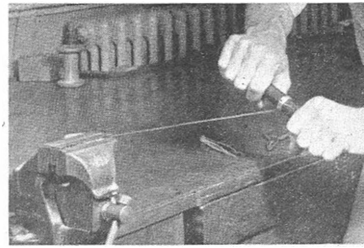
Heading photo shows the completed unit with keying lead. Note the modification to the micro-switch which makes for comfortable handling. Right, method of winding aerial coil is demonstrated, showing how wire is kept taut whilst turns are wound on former

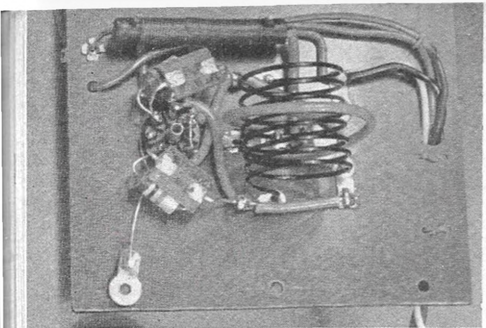
The Case

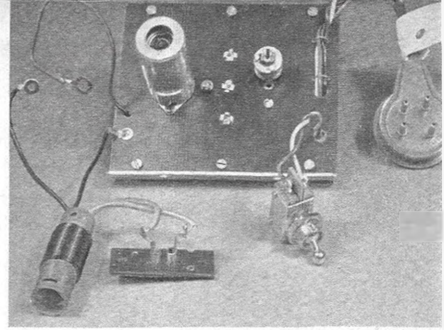
The case involves a fair amount of drilling, so if you can borrow the use of a bench or power drill so much the better. Holes must be drilled to take the switch, the keying lead socket, the meter, and the aerial socket. Again, if you can borrow a press tool for the large holes, you will save time and effort. If not, then they must be cut the hard way by drilling all round the circumference with an ⅛th drill, and finally snipped out with a pair of snips. Use the actual accessories as jigs for marking out their mounting holes, and be careful with the somewhat brittle plastic of the meter when tightening up the mounting screws. Do not drill mounting holes for transmitter unit at this stage.

The tuning Coil

Find a ¼ in. diameter piece of dowel or tubing about a foot long, run a 1/16th drill through the centre at right angles. Take a 40 in. length of 18 gauge enamelled copper wire, thread it through the hole and take on a turn to get a grip. Secure the other end in a vice and







pull hard to straighten the wire. Keeping a fair tension, wind on 12 tight turns in the manner demonstrated in the photograph. You now have a neat coil containing more turns than are actually required, which must be cut down to eight full turns, leaving an additional ¾ in. of wire at each end, bent as shown for mounting. These ends must be scraped clean of enamel for soldering, also a small section in the exact centre for the centre tap. Take a short length of the same wire and remove the enamel. Form a small loop and solder this to the centre tap as per figure. The aerial coil is now ready for fitting in the appropriate sequence as given in the wiring instructions.

The Transmitter Unit.

The Panel is cut from 1/16th paxolin sheet, which is marked out on the underside by means of a scriber, as shown.

Firstly, make the hole for the valve holder by drilling round the circumference of the ⅞ in. scribed circle with a 1/16th drill. Keep slightly to the inside of your guide line, and drill the holes as close together as possible. Using a balsa knife, cut through the divisions between the holes, working from both sides of the panel to avoid splitting the paxolin. Finish off the hole with a round file, followed by emery paper round the file or a piece of dowelling.

Drill the remainder of the panel holes exactly as pattern with an ⅛ drill, using a pilot drill first so as to obtain clean holes.

Scrape all tags and component connections before fitting, until you have bright metal. This is important as it makes for good soldered joints.

Fit eyeletted tags by rivetting them to the panel, most people do this by means of a centre punch. A good tip passed on by Ted Sills, is to grind faces on the tip of a punch so as to form three or four cutting edges. This then splits the underside of the tag with the result that it locks more securely to the panel, lessening the risk of a tag swivelling and causing a short circuit.

Fit the valve holder, making a special note that the wide space between the pins coincide with that between pins 1 and 7. Add double ended solder tags under each screw. Temporarily fix single ended tag to **M** with a 6 B.A. nut and bolt, this for earth lead connection. Lash the battery lead to the panel with waxed thread, leaving 3½ in. between the edge of the panel and the neck of the plastic plug. *Do not cut* any of the plug leads at this stage. Colour code for the leads, as supplied, is as follows:

H/T	—	**RED**	**L/T**	+	**BROWN**
H/T	—	**YELLOW**	**L/T**	—	**BLACK**

Wiring Connections

The diagram shows the underneath of the panel with all the various tags keyed for easy reference. If you follow the sequence exactly as given, then no difficulty should be experienced. All panel wires should be insulated with systoflex unless already plastic covered.

1. Connect **M** to **A1** to pin 4 of valve.
2. Connect **B1** to **H**.
3. Connect **Black** and **Yellow** battery leads to **H**.
4. Connect 10k resistors in turn, one from **A2** to pin 3, one from **B2** to pin 5.
5. Fit 30 pf Beehive by soldering centre pin through tag **G**. Trim off surplus pin. (N.B.—This on the top of the panel.)
6. Connect pin 2 to tag **E** continuing connection to side contact of Beehive. *Do not* solder to Tag **E** at this stage.
7. Connect pin 6 to tag **C**, continuing lead to Tag **G**, again not soldering to tag **G** at this stage.
8. Connect one 100 pf capacitor between pin 3 and tag **C**, and the other between pin 5 and tag **E**.
9. Thread Brown battery lead through hole **L** and twist with it a similar length of flexible lead, sufficient to run from the switch to the valve holder. Connect this switch lead to pins 1 and 7, stripping enough covering to run wire from 1 to 7.
10. Thread **RED** battery lead through hole **N**, running it alongside the switch lead, and tying it with waxed thread to this lead, and the lead already joining **B1** and **H**.
11. Bend one lead of R.F. Choke at right angles, remembering to scrape ends of both choke leads before soldering. Connect right angled lead to tag **D**, the other end to tag **J**. Cut off excess wire after soldering.
12. Cut 5¾ inches of 18 S.W.G. wire, scrape bare 3/16 inches at each end, and insulate with systoflex. Insert one end into centre hole of tag **H**, passing wire under R.F. Choke connection. Form into a single loop of 1¼ inch diameter, and solder other end into centre hole of tag **F**. Ensure that this link coil straddles centre tag **D**.
13. Thread coil carefully through the link coil and solder coil connections to tags **C**, **D** and **E**.
14. Cut the two mounting brackets to shape to fit Rx panel. Bend in vice and drill 6 B.A. holes. For this particular case, the brackets measure ¾ by 4 inches and 3½ by 4 inches before bending.
15. Bolt brackets to Tx panel, and offer the Tx chassis complete to the case. Mark position of fixing holes on the inside, using the brackets as a jig. Pip marks with sharp centre punch from the inside which will indicate position of hole on outside of case.
16. Cut switch leads 3½ inches from panel, bare ends and solder to switch. Cut H/T. lead to 5½ inches and terminate with 4 B.A. solder tag. Cut 6 inches of covered flexible wire, solder to tag **F** and bind, this being the aerial connecting lead.
17. Bare covered ends of keying choke leads, solder 4 B.A. tag to one, the other connects to tag **M**. Scrape ends of the two enamelled wire leads, cover with systoflex, and connect to keying socket.
18. Screw chassis to case, also the keying choke, the two-pin socket and the "on-off" switch.
19. Connect red H/T lead to positive terminal of meter, and remaining lead of keying choke to negative meter terminal. Solder aerial connection to tag on aerial mount, remembering to bind with waxed thread. *Keep all leads clear of beehive tuning condenser.*

Well, that completes our transmitter as far as construction is concerned, leaving two vital tasks to be completed before it can radiate energy into the ether. Firstly, make a thorough check of all wiring, keeping in mind that fact that valves cost 29s. 6d. per time! If you are satisfied, assemble the aerial, plug in the keying lead, switch on, allow a second or two for the valve filaments to warm up, and press the keying switch. The reading on your milliameter should be 27 M/a approximately with full aerial.

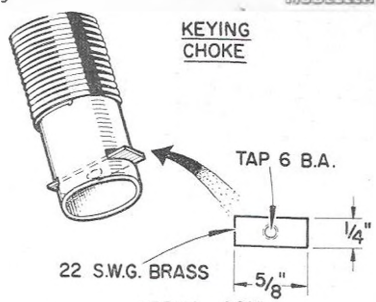
Tuning

Now we come to the tricky part. Tricky because few people have the equipment for accurately tuning transmitters to the specified G.P.O. frequency. One or two of the larger model shops specialising in radio control, do offer frequency checking services at a nominal fee. We shall be pleased to put readers in touch with their nearest frequency checking service on receipt of a stamped addressed envelope. People who are not in a position to take their transmitters for tuning, and who must send them by post, should make certain that they are very securely packed. They should be well insulated against bumps en route and enclosed in a stout carton. Do not forget to enclose the necessary amount for return postage in addition to the fee.

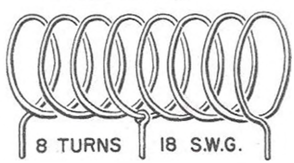
PARTS LIST

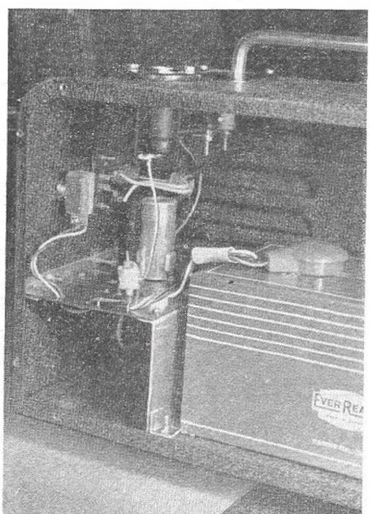
Case
- 4½ by 4 in. of 18 gauge *Aluminium Sheet.*
- 3½ by 4 in. of 1/16th *Paxolin.*
- 1 *"On-off" Switch.*
- 1 *Polarised 2-pin plug and socket.*
- 1 *Keying Choke.*
- 1 *Aerial Socket.*
- 1 0-50 *M a Moving Coil Meter.*
- 1 8 *ft. Sectional Aerial.*
- 1 *Ever-Ready B.136 Batrymax 90v.*
- 1 *Ever-Ready Plastic 4-pin plug and lead.*
- 17 6 *B.A. nuts and bolts.*
- 3 4 *B.A. nuts and bolts.*
- 1¼ *ft. Systoflex.*
- 1 *ft. Plastic covered multi-strand wire.*
- 1 *ft. 20 gauge tinned wire.*
- 1 *D.C.C. 90 valve.*
- 1 *Valve screen.*
- 1 *B7G valve holder.*
- 1 30 *pf. Beehive condenser.*
- 2 10*k Resistors.*
- 2 100 *pf.* ± 1 *per cent. Condensers.*
- 1 *Eddystone 1011 R.F. Choke.*
- 8 *Single-ended rivetting tags.*
- 2 *Double-ended solder tags.*
- 1 *Micro switch and lead.*

Pictures opposite show, left, underview of panel, and right, top view with ancillary components connected. Below, the complete unit assembled in case. A wedge of corrugated cardboard is slipped between battery and mounting bracket to prevent the battery moving about when travelling

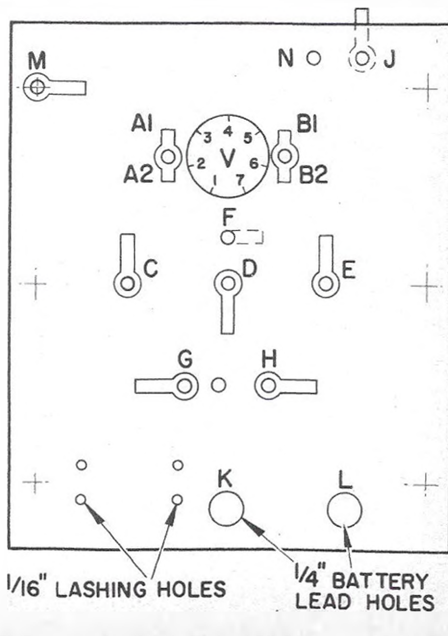


AERIAL COIL





PANEL LAYOUT shown actual size



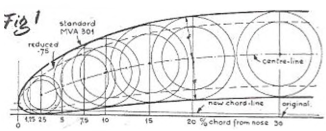
Slimming your Sections

The mysteries of "percentage" airfoils explained by that well-known Dutch authority—

JUST VAN HATTUM

HERE's how to obtain that thinner section so freely quoted by the experts. Thinned sections are popular for tail surfaces, and are current vogue for A/2 wings—the simple process being as follows.

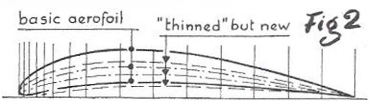
The centre line is the line which contains all the points which are equidistant from the upper and lower surfaces. It can be constructed by drawing inscribed circles in the aerofoil and connecting the centres of these circles by a smooth curve. See *Fig.* 1.



If one draws a new set of circles with a *fixed reduced radius* (*e.g.* 75 or 60%) on the centre-line, the tangential curves drawn to these circles will give us the new reduced aerofoil.

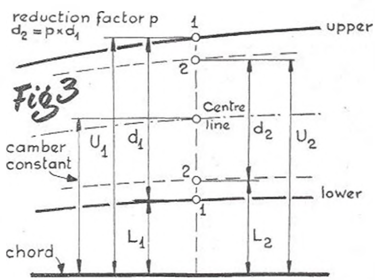
If one reduces the original aerofoil down to the centre-line one is left with the curved plate. The centre-line has become the reduced aerofoil.

This method is reliable, provided the aerofoil is drawn to a large scale, say 20 inches. When the new aerofoil shape has been found, a new table of ordinates is calculated by actually measuring up the dimensions at the usual standard stations. It should be noted that the new aerofoil will have a new tangential chord-line, which usually turns at a slight angle from the tail to the nose. There will be no difficulty in establishing the table with reference to the new chord-line.



It will be clear that a complete table of ordinates is desirable. Unless one has tabulated the ordinates, it will not be possible to use the aerofoil on any desired chord at any time one desires. *Fig.* 2 shows the method sometimes mistakenly adopted (which takes all reduced measurements up from the base line), does give us a reduced section but an entirely new shape. All ordinates have been multiplied by a reduction factor. It will be seen that a new centre-line emerges which immediately stamps it as a different thing altogether.

Apart from a careful construction it is also possible to use an approximation which gives quite good results. There is, however, a slight inaccuracy in the larger ordinates at the pronounced curvature near the nose, which may amount to 0·1% of the chord (6/1000 inch on a 6 inch chord). *Fig.* 3 shows the principle of this method which has been expanded in the table given by *Fig.* 4. The work



appears more involved than it actually is. The reduction factor "p" is multiplied by measured aerofoil depth, above and below centre-line, and the result plotted from the common base-line.

When comparing the two methods by plotting the same aerofoil on an 8 in. chord the error proved

MVA 301 Standard and reduced to 75% thickness.

	% Chord	0	1.25	2.5	5	7.5	10	15	20	30	40	50	60	70	80	90	95	100
MVA 301 standard	upper	1.17	3.90	5.10	6.85	8.20	9.15	10.60	11.50	12.25	12.00	11.10	9.60	7.80	5.80	3.35	2.00	0.30
	lower	1.17	0.15	—	0.25	0.65	0.95	1.45	1.87	2.35	2.50	2.45	2.30	1.90	1.40	0.80	0.37	—
MVA 301 75%	upper	0.7	2.7	3.9	5.5	6.7	7.6	9.1	9.9	10.6	10.5	9.8	8.5	6.9	5.0	2.9	1.7	0.2
	lower	0.7	—	—	0.5	0.9	1.3	2.1	2.6	3.2	3.4	3.3	2.9	2.4	1.8	1.0	0.6	—

% from nose	upper U	lower L	U-L	$\frac{U-L}{2}$	1+p	1-p	$(1+p)\frac{U-L}{2}$ A	$(1-p)\frac{U-L}{2}$ B	A+L upper	B+L lower
0	---	---	---	---	---			---	---	---
1,25	---	---	---	---	---			---	---	---
2,5	---	---	---	---	---			---	---	---
↓	---	---	---	---	---	---	---	---	---	---
15	10,60	1,45	9,15	4,58	1,75	0,25	8,03	1,15	9,48	2,60
	---	---	---	---	---	---	---	---	---	---

Fig 4

to be immaterial and less than the degree of accuracy with which one is able to plot an aerofoil and later transfer it to the actual structure. One can, however, construct the nose portion with the method given in *Fig.* 1. When the table has been calculated, the aerofoil should be drawn again from these figures and adjustments made for "kinks" and irregularities.

The aerofoil constructed as in *Fig.* 3 will again be plotted with reference to the original chord-line and the lower surface will not touch the chord-line except at the tail. This has relatively little significance, and it should not cause anxiety!

Both methods entail rather a lot of plotting and calculating, but one cannot obtain a table of ordinates for future use in another way. If however, one needs to fix a simple rib of a thinned down aerofoil one can use *Fig.* 5. Here the plotting is done entirely "by eye" and is quite suitable for a "one off" job. With some care and patience one can get surprisingly good results, but the new aerofoil cannot quite earn the mark of true reduction.

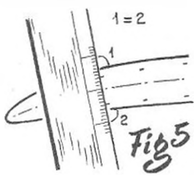


Fig 5

A true centre-line still has to be constructed for use as a basis for symmetry since it is not exactly a simple matter to guess the centre point when measuring off with the ruler for each change in upper or lower camber. For small chords, wanted quickly, the ruler method is good enough.

A table is given of the well-known and excellent MVA 301 aerofoil in standard form and reduced to ·75 per cent. It has been constructed according to *Fig.* 1 on a 20 in. chord.

There are a good many aerofoils which will show up well under this slimming treatment, but it will need no underlining that the actual construction of the wing should match the care and accuracy spent on the new aerofoil.

An apparently simple case is the aerofoil with a flat lower surface, but study of *Fig.* 2 will show that true reduction about the centre-line will result in a concave lower surface! Many designers choose the upper curvature of the main aerofoil for the thinned tail-plane section which may be as good a method as any.

Fig 6


Engine Analysis *(continued from p. 643)*

to eliminate such inherent sources of error, as far as possible. The engine itself was radially mounted on a $\frac{3}{32}$ in. plywood bulkhead, again simulating "normal application" conditions. With beam mounting a somewhat higher vibration level would probably have been present.

Torque output was steady at 5 ounce-inches over the ower range of operating speeds, and maintained down to about 6,500 r.p.m. Below this, torque dropped off appreciably. At the other end, speeds approaching 14,000 r.p.m. were achieved with propeller loads. Hand starting was employed in every case and proved quite easy and quick. (Note: some fuels, notably Mercury No. 8, tended to produce a more vicious start. This was noticeably absent with Allbon fuel.)

A pleasing feature was the Merlin's ability to swing small diameter high-pitch propellers at high speeds, which should therefore make it a very attractive power plant from the control-line modellers' point of view. A 6 × 5 propeller would appear about the best size for control-line stunt and the same, or 6 × 6 for team racing. Fuel consumption checked was 22 seconds per c.c. at 7,000 r.p.m. and 17 seconds per c.c. at 10,000 r.p.m.

For free flight, a 7 × 4 propeller appears just the right size, or possibly a 7 × 3 for maximum climb. An 8 in., diameter propeller appears about the maximum size for useful performance.

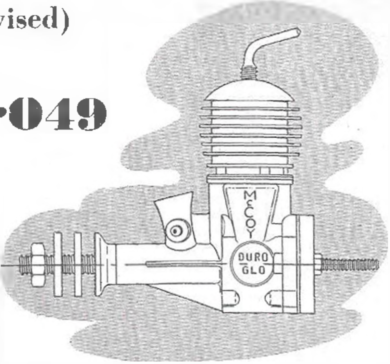
Constructionally the Merlin represents the application of standard mass-production methods allied to straightforward design. The steel cylinder is an apparently slack fit in the crankcase casting, yet beds down very nicely on its thin gasket when the light alloy cylinder jacket is screwed in place. This assembly, incidentally, was very good and showed no signs of unscrewing during running. The 360 degree transfer and exhaust porting is non-directional in the sense that it does not matter in which (rotary) position the cylinder is assembled. Neither, surprisingly enough, does it matter very much how the spray bar is assembled, *i.e.* in which direction the hole is pointing.

The piston appears somewhat on the heavy side and again of simple design. Main crankcase bearing is plain which appears more than adequate for this size of engine, and again makes for simplicity. There is a fair fore and aft play when assembled which can produce a disturbing "clank" as the engine stops, but this again is probably the result of working to *practical*, rather than extreme tolerances. Beam mounting holes are drilled to take 8 BA screws. Main screws bolting the crankcase assembly together are 6 BA—a size which may prove a little difficult to match with an American standard—the nearest equivalents being Nos. 3 or 4 (NC or NF). Our suggestion here—produce the "export" models with American screws, and long enough for use for radial mounting. Also we feel that with all radial mounts, especially where assembly screws also serve as hold-down screws, a lock nut is essential. Yet no engine manufacturer seems to feel the same way and leaves the customer to purchase lock nuts separately.

Our general impressions: a wonderful little engine for 47s. 6d. and of a size which, if not an official British "class," we feel is most welcome. Although production costing has meant the sacrifice of one or two refinements, performance does not appear to have suffered in any way. In fact, the Merlin will give away another quarter of a c.c. and do a "man-size" job directly comparable with its 1 c.c. brother. It is a pleasant and easy engine to handle and looks rugged enough to last indefinitely.

ENGINE ANALYSIS (Revised)

The McCOY ·049 "Duroglo"



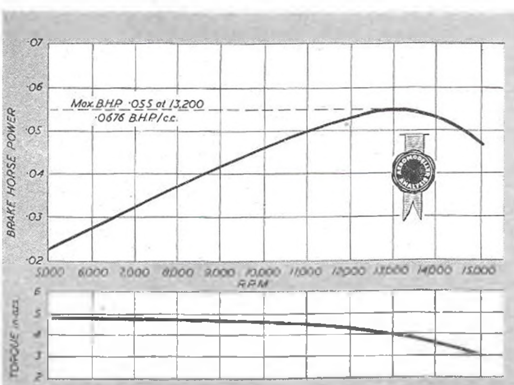
EXTENDED TESTS on a new-type reaction cradle established the maximum B.H.P. of the McCoy ·049 as ·055, at 13,200 r.p.m. Particular attention was paid to obtaining stable and accurate figures at the lower r.p.m. range. Like many other high-speed engines, the McCoy is not particularly happy when loaded down to speeds below about 8,000 r.p.m., so that steady readings below this r.p.m. figure are not readily obtained. It does now appear certain, however, that the torque figure remains appreciably constant over a range of some 5,000 r.p.m. then dropping off steadily, but not rapidly.

Maximum B.H.P. is realised at a speed just in excess of 13,000 r.p.m., equivalent to a propeller size of 6 × 2½ in. (constant geometric pitch). A 6 × 3 propeller would, therefore appear to be the correct size for free-flight models.

An interesting feature is that the r.p.m. figure can be extended well beyond the peak horse power r.p.m., the engine continuing to run steadily and smoothly. It was felt advisable to stop at 15,000 r.p.m. as this was obviously well beyond the B.H.P. peak but maximum speed obtainable with a fly-wheel (no load) would probably approach 17,000 r.p.m. At this speed, of course all the power developed would be used up in driving the engine itself. In other words, torque output would be zero and the engine would not be capable of doing any useful work.

The fallacy of over-speeding an engine is exemplified by the fact that the power delivered at 15,000 r.p.m. is about the same as at 10,000 r.p.m. In other words the "working capacity" of the engine is the same at these two speeds, with wear obviously much higher at the higher speed.

Initial tests were terminated by the breaking of the crankshaft. The new crankshaft featured the same rather loose fit in the main bearing, resulting in some fuel seepage through the bearing. Virtually, no additional period of running in was necessary, propeller-r.p.m. figures checking out identical with those previously established for the run-in engine.



Despite comments from other sources, the McCoy ·049 confirmed the "easy starting" characteristics mentioned in the previous report. The only unusual feature, as compared with British diesels, is the lack of "feel" on the compression adjusting screw, due to the use of an O ring for compression seal and elastic adjusting screw seating. However, compression setting is not very critical for starting and, provided the engine is sufficiently primed, starting is very positive.

The previous test report was published in the October, 1953 issue of "THE AERO-MODELLER."

CLUB NEWS

IT SEEMS that rubber team-racing is becoming a standard indoor activity for the winter months, and great fun it is too. If your club hasn't got in on it yet, take a look at the N.W. Area rules given below; you can knock up a model in an evening and any room giving a clear twelve-foot circle is adequate. It's a contest that everyone can have a bash at—even the juniors can afford it!

South Eastern Area

Still engaged on a new member drive which has included newspaper publicity, window displays, an information sheet sent to anyone interested, and the insertion of cards giving club details into all kits sold by the local model shops, the **SOUTHERN CROSS A.C.** has recommenced its Saturday evening meetings at East Hill House, Portslade. Scheduled are building periods, talks, and educational diversions of various types.

North Western Area

Postponed contests in **CHESTER M.F.C.** have now been flown off. Open power went to C. R. Fittness, with D. Dodd top junior; team race was won by the Wilde/Nichols/Williams combo, flying a tailless pusher. A recent slope-soaring foray into the hills around Clwyd was thoroughly enjoyed.

Thirteen flights aggregating 30 : 23 deservedly earned John O'Donnell the Croydon Gala Championship. Brother Hugh was sole **WHITEFIELD M.A.C.** member with any joy at the Y.E.N., 5th in rubber and 2nd in chuck glider. John placed top in the Area elims. (Wakefield) and also returned top individual time in the M.E. Cup. Same man and place again in the A2 eliminator, and he even entered power, coming around fifth! Area Champion with 37 : 32 aggregate proved to be—need we say? Other club successes include J. Parrott, 1st in the power eliminator with 14 : 38, and J. Trainer, 3rd in Wake.

Rules for indoor rubber team racing have been standardised by the Area Committee, and a league (home and away fixtures—wot, no 12X?) is being formed. D. Cooke, 63 Stancliffe Road, Wythenshawe, will give you the gen, but here briefly are the rules: (i) rubber driven, semi-scale, celluloid cockpit or cabin, fixed two wheel u/c, 1 in. wheels; (ii) max. l.o.a. 20 in. (iii) min. span 12 in.; (iv) max. weight 2 oz.; (v) 6 ft. line, pole to inside tip; (vi) pivot height 3 ft.; (vii) R.O.G. after each winding; (viii) 3 flights per contest, lowest counts, all attempts are flights; (ix) 40 laps, bounce laps do not count; (x) timing commences on release after initial winding and includes all subsequent winding; (xi) Team is 3 from a club, team aggregate (lowest scores) counts.

Southern Area

This certainly seems to be the Area for club magazines. No. 3 of the **FARNBOROUGH M.A.C.'s** "Ceiling Wax"—eight foolscap pages—has just reached us and provided interesting reading. Even has a trade review! No. 4 may be delayed, as the editor is just off for National Service; this fate is also overtaking one or two other members, depleting the active list somewhat.

Flight of 23 : 10 is recorded in a **BOURNEMOUTH M.A.S.** contest—in 1933! This flight, by A. D. Paine, took place on quite a day, for other flights included 7 : 31 and 9 : 50—some going in those days. Such thermals do still occur occasionally, as witness a recent club comp. when four D.T'd jobs were lost o.o.s.!

In the **B.M.A.S.** v. **WEST HANTS A.A.** challenge match the latter club won the second (power) round with Sid Taylor 1st and clubmates 3rd, 4th, 5th and 6th. All now depends on the results of the glider round. West Hants also collected the honours at the S.R.D.E. Team Race Rally, A. Jones winning A and D Seal B, with **AMESBURY** members runners-up in each event. Winter plans include microfilm, chuck glider, and R.T.P. rubber and Jetex.

Luck deserted **SOUTHAMPTON M.A.C.** in the Area eliminators at Larkhill, and at Radlett, where junior N. Worley experienced the mixed emotions normally following a direct hit on an over-enthusiastic camera-wielder!

So many members have enrolled in the **SALISBURY D.M.E.S.** that meetings have had to be broken down to Engineering Mondays, Aeromodelling Tuesdays, Railways Wednesdays, and Cars Fridays. Thursday is open for G.Ms, lectures, etc. A small gauge railway layout and a car rail track are being built.

East Anglian Area

The A.G.M. for this Area will commence at 2 p.m., on November 28th, at **BRENTWOOD M.E.S.** clubhouse, Primrose Hill. Gen. from the Area Sec., 28 Highfield Road, Chelmsford, if required. Tea will be laid on, followed by a film show, main attraction being three colour films of recent Wakefield contests.

South Western Area

Scattered population means high interest in postal contests in the S.W. **TORQUAY** club, flying on a field which is actually a complete headland with water on three sides (cor!) narrowly beat **EXETER** in one such

CONTEST RESULTS

GUTTERIDGE TROPHY, September 19th.
134 entries.

1.	J. O'Donnell	Whitefield	14 : 57
2.	A. Anderton	Cheadle	14 : 22
3.	J. Trainer	Whitefield	14 : 15
4.	R. Bladwin	Wigan	13 : 57
5.	C. Miller	Bradford	13 : 48
5.	G. Thomas	Slough	13 : 48

MODEL ENGINEER CUP, September 19th.
31 entries.

1.	West Middlesex	32 : 08
2.	Croydon	31 : 44
3.	Northwick Park	25 : 29
4.	Surbiton	25 : 12
5.	Chelsmford	24 : 53
6.	Belfairs	24 : 48

K. & M.A.A. CUP, October 3rd.
263 entries.

1.	E. Midgley	Barnsley	13 : 29
2.	E. Thompson	Northampton	13 : 12
3.	J. O'Donnell	Whitefield	12 : 50
4.	—. Remington	Loughborough	12 : 34
5.	D. Leech	Northwick Park	12 : 15
6.	E. North	Halifax	12 : 13

HALFAX TROPHY, October 3rd
153 entries.

1.	J. Parrott	Whitefield	14 : 38
2.	D. Painter	Henley	13 : 53
3.	G. Hutton	Wallasey	13 : 35
4.	M. Gaster	C.M.	13 : 27
5.	I. Donald	Dunfermline	13 : 11
6.	G. French	C.M.	13 : 04

PLUGGE CUP

Croydon	1326 : 48
Birmingham	1325 : 133
West Middlesex	1117 : 655
Cheadle	1012 : 723
Leeds	1000 : 930
Whitefield	970 : 908

event; **PLYMOUTH** won the Area Shield in another by a convincing win (16 pts. to 2) which has left the Exeter boys still shuddering.

London Area

Two exhibitions, one at a horticultural show and one at R.A.F. Hendon's "at home," have kept **MILL HILL D.M.A.C.** well in the public eye. Junior members did well at Radlett, P. Carey with 2nd and 5th in seaplane power and open rubber, and R. Thoroughgood, 4th in seaplane rubber.

Filliped by a newly-available stretch of tarmac, **HORNCHURCH M.A.C.** have come out in a rash of C/L speeditis. Dead calm conditions obtained at the latest all-in club comp., giving the rubber stalwarts the inside edge; two ultra-lights, Dave Thompson 5 : 51 and Len Ranson 5 : 18, headed the results sheet. Vote of thanks is moved to Radlett police by R. Bishop, whose large glider is back thanks to them.

South Midland Area

Recent Area results are—Wakefield elim. (9 entries), R. Clements (Luton) 8 : 58, M.E. Cup West Herts, 23 : 36, Power elim. (7 entries) D. Painter (Henley) 13 : 53. A2 elim. (26 entries) P. Larcey (Henley) 10 : 44.

The Colvings Shield, for Wakes in **LUTON D.M.A.S.**, was won by D. Wood. Roy Clements put up one terrific o.o.s. and spent all night making a model for the Gutteridge (see Area results above). Sid Miller put his R/C button down to fly a converted Wakefield in the M.E. Cup, in which the club placed third in the Area.

C/L is the rage—especially combat—in **R.A.F. HALTON M.A.S.** Constant flying enabled the boys to put on a crackling display at the station's "at home." Radio is on the up, plus A2 and F/F aerobatic interest, and an indoor programme is all lined up.

Northern Area

Twenty ounces of amyl nitrate is scheduled to disappear into the crop of Olivers now acquired by **LEEDS M.F.C.** Many other engines are being souped with divers (and diverting) results. Affiliation with Bradford is in the wind.

Successes in the eliminators by **BRADFORD M.A.C.** include C. P. Miller 1st in Wakefield with 13 : 48, with A. Miller 3rd, 12 : 39, and D. Lees 5th, 12 : 12. In Power S. Lanfranchi topped with 11 : 50, despite over-runs causing his *Swiss Miss* to lose a flight, S. Eckersley was 2nd with 10 : 55 and four of the next seven places also went to Bradford clubmen.

MEANWOOD I.M. close their first contest year with 11 1sts and 4 2nds or 3rds out of 15 combat contests entered. Ten of the wins were with the *Ker* design, the other with a *Kombat Kapers.*

Scotland

Friday night is club night for **EDINBURGH M.F.C.**, the venue being Ainslie Park School, Pilton. With an 8 ft.-rising-to-14 ft. ceiling. U. A. Wannop has exceeded two minutes F/F—not bad going.

Well, don't get these flimsies stuck on the holly!

Cheers—

The CLUBMAN.

SECRETARIAL CHANGES

HARROGATE M.F.C.
L. E. Carroll, 14 Queens Road, Harrogate, Yorks.
SIDCUP A.S.
A. A. Houlding, 87 Longland Road, Sidcup, Kent.
PLYMOUTH M.F.C.
D. P. Malin, 43 Brancker Road, Peverell, Plymouth, Devon.

MIDGET MUSTANG. 24" control line replica of the American Sport plane. By "VERON." **Kit 26/3d. Incl. P. Tax.**

Bob Wheatley

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Diesel ENGINES		P.T.
Allbon Dart .5 c.c. ...	54/-	+ 10/2
Allbon Spitfire 1 c.c.	54/-	+ 10/2
Allbon Javelin 1.5 c.c.	55/-	+ 10/4
E.D. Baby .46 c.c. ...	45/-	+ 7/3
E.D. Bee 1 c.c. ...	47/6	+ 7/3
E.D. Hornet 1.46 c.c.	48/-	+ 9/-
E.D. Racer 2.46 c.c. ...	66/-	+ 12/4
E.D. Hunter 3.46 c.c.	66/-	+ 12/4
Amco P.B. 3.5 c.c. ...	60/-	+ 11/3
Amco B.B. 3.5 c.c. ...	78/8	+ 14/9

JETEX OUTFITS		
Atom 35	8/-	+ 1/4
Jetex 50	10/11	+ 1/10
Jetmaster (100) ...	24/-	+ 4/-
Jetmaster Augmenter tube	5/-	+ 10d.
Jetmaster fuel ...	2/6	+ 6d.
Atom fuel per carton	1/6	+ 3d.
Jetex 50 per carton ...	1/8	+ 4d.

All Jetex accessories in stock

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Minojet (For 50) ...	3/6	+ 7d.
Fouga Cyclone (50) ...	5/-	+ 10d.
Sabre (Scale for 50) ...	5/6	+ 11d.

JETEX TAILORED KITS		P.T.
Voodoo for the 50 ...	6/4	+ 1/1
Hunter for Jetmaster	15/6	+ 2/4
Swift for Jetmaster ...	18/-	+ 3/-
Skyray (50)	9/9	+ 9d.
Super Sabre (50) ...	9/9	+ 9d.

MOTOR LAUNCHES		P.T.
Seagull 18"	16/6	+ 2/9
Dolphin 24"	30/-	+ 5/-
Police Launch 26" ...	36/-	+ 6/-
Marlin 36" ideal for R/C	62/6	+ 10/5

VERON DUCTED FAN		
Lavochkin La. 17 ...	25/-	+ 4/2
Sabre F.86 E. up to 1 c.c.	25/-	+ 4/2

Kits include Impeller and pulley

CONTROL LINE		
Nipper all balsa ...	10/6	+ 1/9
Bee-Bug .75 to 1.49 c.c. Stunt	12/-	+ 2/-
F.W. 190 33" span	21/-	+ 3/6
Sea Fury up to 3.5 c.c.	23/6	+ 3/11
Wyvern up to 3.5 c.c.	23/6	+ 3/11
Spitfire 1.46 to 3.5 c.c.	27/6	+ 4/7
Minibuster "A" T/R ...	15/-	+ 2/6
Philibuster "B" T/Racer	23/6	+ 3/11
Panther (Stunt) ...	25/-	+ 4/2
"Quicky" Trainer ...	7/6	+ 1/3

ELECTRIC MOTORS		
Taycol "star" 6 to 9v.	15/2	+ 2/6
"Comet" 6v. ...	11/7	+ 1/11
"Geared Comet" 6v.	17/7	+ 2/11
Twin Geared Comet 6v.	19/10	+ 3/4
Electroter Type 240 ...	8/6	+ 1/5

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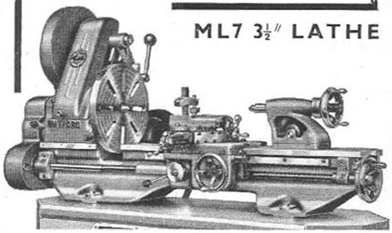

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