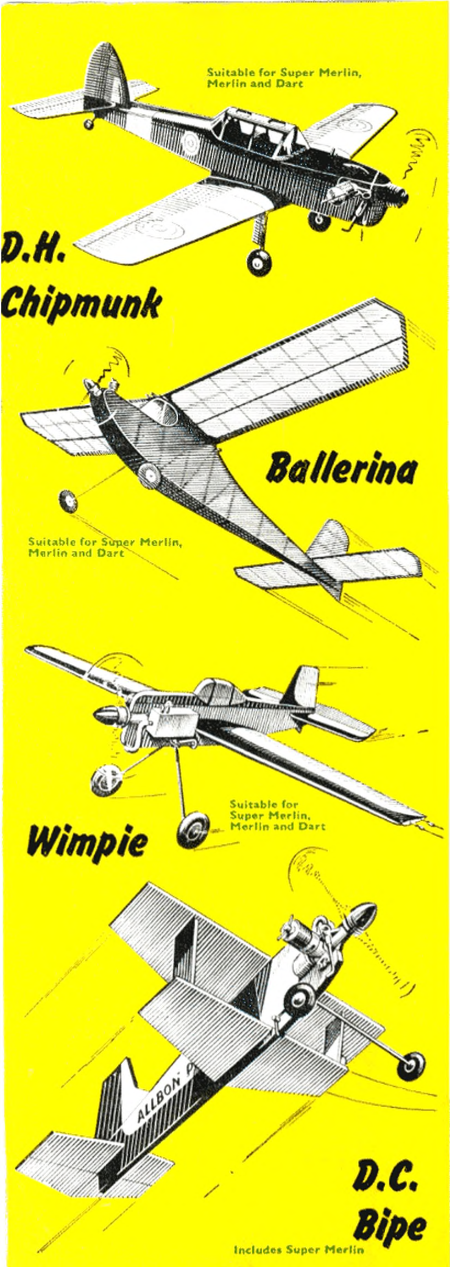
JANUARY 1957

AERO MODELLER

1'6



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CHIPMUNK

20-inch span. This control line scale model is an accurate replica of the actual training aircraft used by H.R.H. The Duke of Edinburgh. Authentic registration letters, roundels, etc., are included in a sheet of quality transfers and the kit is absolutely complete with wheels, tank, and pre-shaped wing. All parts are accurately printed on top grade balsa and construction is made child's play by the schematic stage-by-stage instruction sheet. *PRICE including tax* **15/-**

BALLERINA

36-inch span. Fit this model with a Super Merlin and you have the perfect combination for a first power model. Construction is simplicity itself. The Kit includes accurate printed parts, shaped trailing edges, etc., all on satin smooth top grade balsa. Big feature of the design by Vic Smeed is its foolproof performance. Even the beginner will find it difficult to prang, yet snappy performance up to contest standard can be achieved if required. *PRICE including tax* **16/6**

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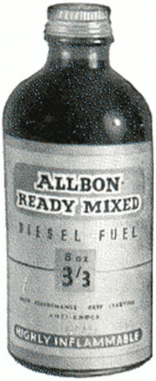
ALLBON SUPER FUEL

Special Additives give this five part blend of quality ingredients the characteristics that model engines need most. Easy starting, smooth running, and real power, are its main virtues. For these reasons we recommend it for our own engines.



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Price £3.4.5

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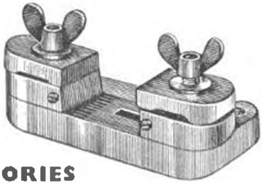
Price 12/11



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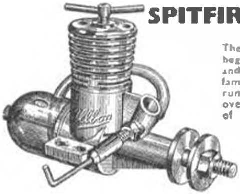

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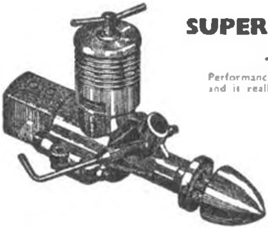

SUPER MERLIN

.8 c.c. .049 cu. in.

Performance is as good as it looks, and it really is easy to start and operate. Ideal for the "Chipmunk" and "Ballerina", kits shown left. Complete with propeller, spinner and tommy bar.

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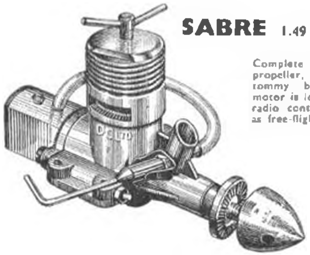
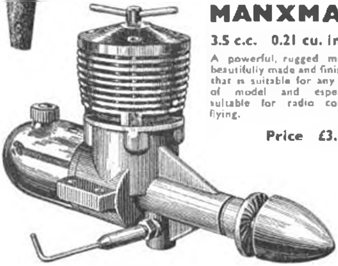


SABRE 1.49 c.c. 0.9 cu. in.

Complete with integral tank, propeller, spinner and tommy bar, this powerful motor is ideal for the smaller radio control model as well as free-flight and control-line.

Price £2.12.7



MANXMAN

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A powerful, rugged motor, beautifully made and finished, that is suitable for any type of model and especially suitable for radio control flying.

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KIT PRICE (including P. Tax) 34/6

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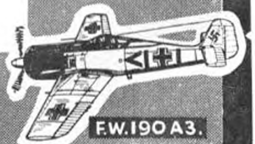

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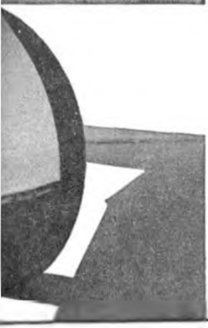
Per ardua...ad astra. *It is not easy to fly with the R.A.F., to lead others, to shoulder great responsibilities while still young. But in the lasting satisfaction of this immensely worthwhile career...*

great effort finds great reward



A YOUNG MAN'S DREAM may dwell on flying — on the exhilarating challenge in the airy spaces of sky. His common sense tends to call him back to earth — to consider the future and the building of a career.

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In the Royal Air Force today you can satisfy both these demands — and the new appointment of Air Electronics Officers means more can now fly. These highly skilled men are trained to be responsible for all the electronic devices in the new V-bombers. But aircrew are much more than flyers. They are often seconded for other important work in Britain and abroad. Training others, international liaison, aircraft development — these are but some of the jobs that may come your way. And responsibility grows fast. You can be a Group Captain while in your early forties, responsible for perhaps fifteen hundred men and several squadrons of modern aircraft. Beyond that? There is no limit. Quality counts in the R.A.F. and there will always be room at the top for good men.

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AND RELAXATION. Work over, pleasure begins. Gliding, yachting, winter sports — these and many other privileged pastimes link up with a social life that is full and varied.

The Royal Air Force

Flying . . . and a career

"Covers the world of Aeromodelling"

VOLUME XXII
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JANUARY 1957

Managing Editor - - - C. S. RUSHBROOKE
Editor - - - - - - - H. G. HUNDLEBY
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Special features

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Regular features

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THIS YEAR, NEXT YEAR . . . !

SINCE INTERNATIONAL competition in the model aircraft field first got under way back in 1929, following the introduction of the Wakefield Trophy, the scope of such top level events has widened until today we have four Championship classes covering the three free-flight categories of rubber, power and glider, plus a class for control-line speed.

Until 1956, such World Championship events have taken place annually, forming the greatest incentive to top line model development in the world. Now, however, the recently held F.A.I. Models Commission meeting has decided that in future the Championships will be paired up, and held in alternate years, with the object of effecting a compromise between four separate annual meetings and the combined "Olympics" proposed in these columns some five years ago. Czechoslovakia exercises her right to hold the Glider and Speed events in 1957, and with Sweden withdrawing her option on the Wakefield, this and the Power event will most likely take place in England in 1958.

Whilst there are undoubtedly some very good grounds for this splitting up of the four Championships, not the least being the questions of expense and accommodation, we reserve judgment at this stage on a subject that can have very widespread repercussions. Our immediate reaction is that the pairing of the events is wrong, for it would seem logical to link the power and speed events at one meeting, the competitors being able to assist each other to a greater degree than the boys who do not employ mechanical motor to get their models airborne. Obviously the current pairing has been dictated by the successes of Czechoslovakia in 1956, but we foresee a revision in the near future.

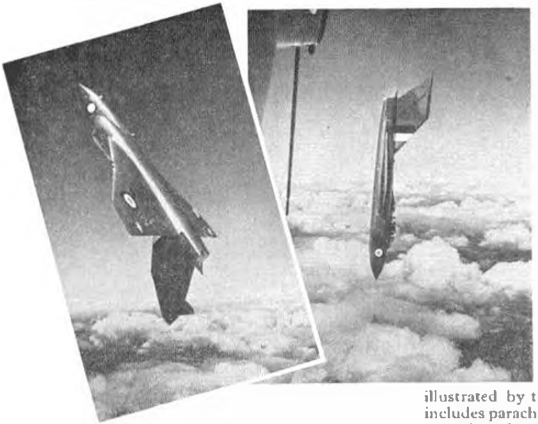
A compromise has also been introduced into the vexed question of power model specification, the proposed 400 gram per c.c. capacity being reduced to 300 grams, but the wing loading minimum has gone up to 20 grams per dm². Fortunately, the move to reduce maximum engine capacity to 1·5 c.c. has not gone through at this stage, so those with hot 2·5's can breathe again . . . at least for another year or so.

We are *NOT* happy about the reduction of rubber weight in the Wakefield model to 50 grams. Ever since the Wakefield specification began to be mucked about, interest has fallen off considerably in this interesting and important class, until today the top line rubber-driven model attracts only a specialised few who can cope with the altering requirements. Knowing aeromodellers, we have no doubt that the new requirements will soon be dealt with, and we shall probably have a new restriction imposed in order to avoid a possible fly-off.

At long last that so controversial requirement R.O.G. disappears from contest regulations, and very few will mourn its passing. Whatever its virtues, the requirement to rise-off-ground created so many arguments between competitor and official that most peace-loving people will welcome its demise. No longer will there be those fierce arguments as to whether or not a model was pushed at take-off, or that three points were not touching the deck at release. Greatest of all will be the disappearance of those stupid bits of wire and wood that purposed to be an "undercarriage", though how a model was expected to "stand unassisted" on such contraptions will ever remain a mystery.

On the cover . . .

MOST ADVANCED all-weather fighter in Service with European forces is the Delta Winged Gloster Javelin Mk. 1. Based at Odiham in Hampshire, Number 46 Squadron has been conducting service proving trials of this noteworthy aircraft and by courtesy of the Commanding Officer and Air Ministry we are able to present G. A. G. Cox's magnificent detailed drawing of the aircraft on pages 28/29 of this issue.



Heard at the Hangar Doors

Photo Talk

WHAT GOES UP—must come down, might well be the theme behind the two magnificent examples of air to air photography reproduced above. Taken by Russell Adams, Chief Photographer of the Hawker Siddeley Group, who is responsible for most of the Gloster Aircraft Company's publicity photo's, they serve to illustrate the manoeuvrability of the Javelin all-weather fighter.

We had the pleasure of listening to a talk given by Russell Adams to members of the London Society of "Air Britain", and after learning that he has to suffer forces of four and five times gravity during each formation loop, supporting a 7 lb. home-built camera, changing plates at the top when hanging on the straps, and "greying out" on the pull out at the bottom—we consider that he deserves extra credit for his fine efforts.

Incidentally, we feel that a large number of aeromodellers, particularly flying and solid scale enthusiasts, would appreciate these monthly "Air Britain" meetings on the first Wednesday of each month at Caxton Hall, Westminster. Those living outside the London area will be interested in membership through local groups. Some half-dozen publications, notably the bi-monthly 24-page news digest, a fine photo-sales service, with one of the most comprehensive range of negatives in the country, a lending library and Aeronautical records section, are but part of the services available to members. Write to the Hon. Gen. Secretary, 318 Barking Road, East Ham, London, E.6, for details.

Modelling Film

Frank Gardner, whose production "Easy to Fly" has been seen by thousands of aeromodellers throughout the world, has made another fine commentary on our hobby. Titled "Model Makers", Frank's latest three-reeler, which runs for 15-20 minutes, is now on M.G.M. distribution and has already had its premier at the Empire, Leicester Square (there was another, rather longer film on at the same time to support it) and it will be shown on private (as distinct from A.B.C. and J. Arthur Rank) circuits within the next few weeks.

The aeromodelling side is ably illustrated by the inimitable Ray Malmstrom, who includes parachute dropping in his party piece, while a number of non-flying devices, which are right out of this world, have been contributed by our own Peter Holland in the form of Space Travel models, all of which have been featured in turn by our companion magazine, MODEL MAKER. If you spot the title among the supporting films at your cinema, we advise a special effort to go and see it.

Obituaries

1956 has been a bad year for the modelling fraternity, for as we go to press, we regret to learn of the death, on November 27th, of one of the best-known model traders in Great Britain, Mr. Harry York of the famous 171 New Kent Road establishment.

Harry, who commenced business in radio supplies, began to develop the model aircraft side of the business way back in 1928, and his shop rapidly became the Mecca for aeromodellers from all over the world. You could always rely on meeting the top names at some time or other at "171", and many are the hours we have spent discussing high and low topics in the back shop. Harry, who was 54, was made a Fellow of the S.M.A.E. before the war in recognition of his work for the movement, and in particular his sterling efforts as P.R.O. for the Society, a post he held for many years.

Invalided out of the R.A.F. following a serious accident whilst servicing a big bomber, he had suffered from poor health for a number of years, as a result of which he abandoned his official duties whilst at the same time retaining a vital interest in all matters concerning the hobby. His passing will create a loss that will be felt wherever aeromodelling is discussed.

Another good friend in the trade who has passed on, is Mr. P. S. Fisher of Colchester, who founded his model accessories business in 1945 at Station Yard, Twickenham. Mr. Fisher was 53 years of age, and served from 1940-1945 in the R.A.P.C., seeing service as a Field Cashier. His daughter, Mrs. G. Southam, will continue running the business at Twickenham, and his wife and son will carry on at Colchester.

Rad(let)ical Comments

Numerous letters have been received following the publication of Captain Milani's comments in the December issue, concerning the Concours d'Elegance event at the All Britain Rally. The following view has been received from the organising officials and clarifies one or two points raised by Captain Milani.

Dear Sir,

"The letter from Captain Milani in your December, 1956 issue, coming as it does from one of our foremost scale modellers, is deserving of serious attention. Unfortunately, however, the writer's arguments are based on false premises, and the conclusions he draws are consequently misleading.

The Concours d'Elegance contest at Radlett, as in other spheres, is to decide the best model on the basis of construction and finish. Flying qualities by definition, should not influence the result of such a contest, but the organisers felt that the nature of the meeting made it essential that all models entered should be capable of flight, and not be merely 'exhibition' models. A minimum flight time, to be officially recorded on the day (before or after the judging), was felt to be a logical qualification. Other contests at other meetings omit flying altogether or judge also on flying ability, but the latter are not strictly Concours d'Elegance.

Since the contest is to find the best-looking or best-constructed models on the field, we believe it to be illogical to refuse entry to any model on the sole grounds that it has been entered or placed in previous years. Would Captain Milani also apply this reasoning to duration contests? It is noteworthy that the winner of the Scale section and of the cup for the outstanding model (beating both the four-engined models—each of which has previously won the trophy—and Captain Milani's own entry) was the Avro Tutor, entered for the first time by Flying Officer Norman.

It appears, therefore, that to one modeller at least the inclusion of previous winners proved to be no handicap. Would he have had as much satisfaction in winning had his model not been judged in comparison with these formidable competitors? The time taken by the distinguished judges of this contest (they include the Chief Test Pilots of two of our greatest aircraft manufacturers) in arriving at their decision is proof of the seriousness with which they regard their task.

With regard to Captain Milani's final point, you are of course, already aware (since you possess a copy of the Official List of Results) that the Spitfire model referred to does not appear in the list of prizewinners. It was in fact, disqualified because it failed to fly for the minimum time previously referred to. It was *provisionally* classified fifth, subject to a satisfactory flight, and this may have confused Captain Milani, whose own model gained a well-deserved fourth place.

Contestants at future All Britain Rallies, can rest assured that the "minimum flight" rule in the Concours d'Elegance will, as in the past, be rigidly enforced. Whilst we cannot agree that previous winners should be disbarred from competing again, Captain Milani's other suggestions (*e.g.*, for examination of models after flight) will certainly be most carefully considered."

St. Albans. K. J. A. BROOKES.

REPORT ON THE F.A.I. MEETING

NOVEMBER, 1956

PRESENT:

France, Switzerland, Holland, Czechoslovakia, Germany, Great Britain, Italy, Spain, Yugoslavia and Belgium

THE MAIN ITEM on the Agenda was the question of grouping the four World Championships as proposed by a number of countries, since this naturally affected the establishment of the calendar for 1957.

It was finally decided to adopt a compromise between the two points of view by grouping the four Championships into twos, and holding each group in alternate years. This was facilitated by the fact that Czechoslovakia had applied for permission to exercise their option for running the Glider and Speed Championships for 1957, and Sweden had withdrawn from their option to run the Wakefield Rubber event for 1957. Thus for 1957 there will be only one World Championship meeting, and this will be held in Czechoslovakia, when the Glider and Speed events will be held. There will be no Power or Rubber events for 1957, but these have been offered to Great Britain for 1958.

This does not prevent the running of regional international events for the dormant categories in each year, and has the effect of greatly reducing the yearly travel costs for every nation, and the organising costs for the host nation.

The Glider and Speed Championships have been fixed for August 15th-21st, 1957. Other events fixed on the calendar are:—

Fifth International Hydro Model Contest ...	Monaco	May 4th/5th
Criterium of Europe	Belgium	June 14th/15th
Alpen Cup, Power and Glider	Austria	July 2nd
Flying Wing International Contest	England	Date to be announced
Fifth International Radio Control Contest ...	Belgium	Sept. 6th/9th

In the case of the Flying Wing Contest, it was agreed to apply the A/2 formula with a loading of 12 grams dm^2.

It was generally agreed that costs to visiting teams should be kept to a minimum.

Concerning the controversial question of Power model specifications, it was decided that the best proposal was the formula submitted by Switzerland, as it enabled a wider variety of engines to be used (up to 2·5 c.c.), deals with every eventuality, and produces a model of reasonable size. This will be referred to all National Clubs for postal vote with a view to its adoption in 1958.

The proposed formula is:—

For each 1 c.c. of cubic capacity ...	300 grams minimum total area
Maximum permissible cylinder capacity	2·5 c.c.
Minimum wing loading per dm^2 ...	20 grams
Maximum wing loading per dm^2 ...	50 grams

On the question of hand launching, there was an overwhelming vote in favour of its general adoption, with the exception of radio controlled models, which must be started from the ground. This will come into operation on January 1st, 1957.

Weight of the rubber motor for Wakefield models is reduced to 50 grams.

It was agreed that in the case of radio controlled contests, the aggregate of two flights be taken for classification.

The question of landing was referred back to the Radio Sub-Committee for further investigation and consideration.

National Air Clubs are to be asked to send in their views on this subject immediately.

For team racing, it was decided to limit the number of competitors in the circle to three, for reasons of safety.

It was decided to refer the question of tightening up the formula for team racing models for possible introduction in 1958. The proposed amendments are to increase the wing area to 12 dm^2 minimum; to restrict the maximum weight to 700 grams; to increase the fuselage to 100 x 50 mm. This will be referred to the Clubs.

No satisfactory conclusion was reached regarding the question of whipping.

On the question of records, it was decided that when a model is built by a team, the record shall be held by all members of the team jointly.

The helicopter definition was amplified to include "A helicopter must be capable of safe descent by autorotation".

It was agreed to modify the manoeuvres for aerobatic contests by eliminating the less useful figures, and adding the "double wing-over". The "climb" and "dive" manoeuvres have, therefore, been eliminated, and the "double wing-over" added, with a scoring co-efficient of eight, for application in 1957. It was also agreed to use the aggregate of two flights for classification purposes.

The scale model you have been waiting for !

Douglas McHard's superb 1/8th scale free flight model of the fabulous 1917 fighter—for 1·5cc engines

Albatros D.V.

THE FULL-SIZE ALBATROS DV was a developed version of the famous D.III as flown by Von Richthofen and detailed by George Cox in his "Famous Biplanes" series last month. It made its first appearance on the Western front during 1917 and the most noticeable new feature was the beautifully streamlined fuselage which replaced the somewhat flat-sided shape employed by the earlier D.III. Although no subject for the raw beginner to tackle, the elegant lines of this authentic flying model will fully repay the experienced builder for the extra effort involved.

For this is truly a scale connoisseur's project. It is the most detailed single-engine scale-model plan in AEROMODELLER Plans Service and the sight of the prototype in the air on flight tests, takes one right back to that famous era of two-gun biplanes fighting it out over the Somme.

One major reason why this model did not appear, as promised in our December issue, was because the flight tests called for further work on the design details. In our endeavour to see that the A.P.S. drawing provides full data for a foolproof model, we spent extra time on this beauty. An initial flying problem was that of side-slipping, which although most realistic in the extreme and probably a scale characteristic adopted from its full-size counterpart, was not the sort of flight path desirable in an otherwise stable model. Happily, this and other minor points have been overcome in the final design and with incidences, engine angles and the balance point specified, the Albatros is a certain flier and one in which all keen modellers will revel.

The 1/8th square balsa used in constructing the fuselage side frames should be carefully selected for its uniformity and firm texture, for upon the accuracy of this basic construction depends the entire alignment of the model! Build the two frames one on top of the other and when completed, allow them to dry out thoroughly before attempting to separate or remove them from the plan. In the meantime, cut out the bulkheads, paying particular attention to the plan notes on the material to employ.

The 1/8th ply bulkheads should be cut with a fretsaw. If 1/8th ply is not obtainable, a satisfactory substitute would be 1/8th inch hard balsa with 1 mm. ply front and back. Where large areas are to be laminated (for example, the wheels and exhaust pipes), the drying time can be drastically reduced by employing one of the contact adhesives, such as "Evo-Stick" or Goodyear "Pliobond" in place of cement. A further advantage of this type of adhesive is the complete absence of warping.

The two halves of the 1/16th sheet formers should be joined together and reinforced by two pieces of 1/8th x 1/8th balsa as indicated on the plan. Formers Nos. 3, 5, 6, 8 and 9 are now assembled *on the engine bearers* and the lower flying wire anchorage hook cemented to former 9. Check the plan view for the correct sidethrust angle.

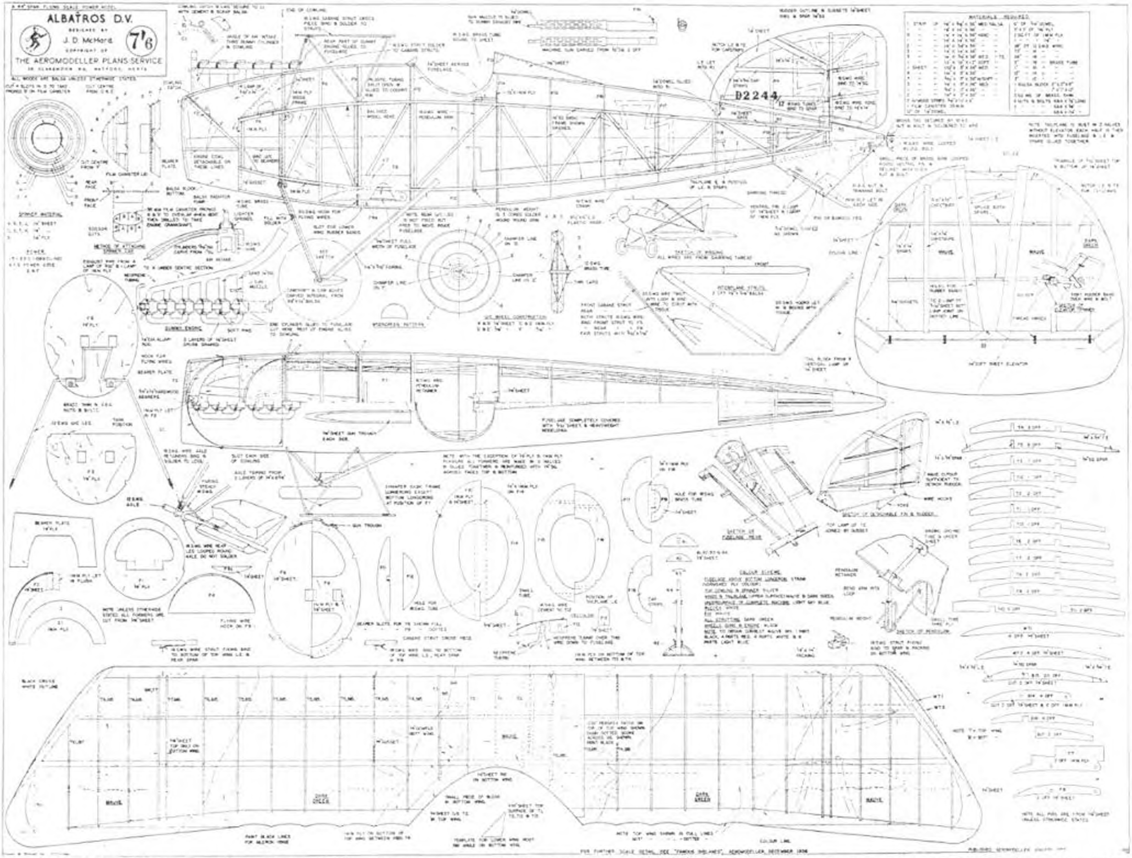
Bend the undercarriage main legs from 12 s.w.g. piano wire and bind them to the motor bearers. This binding is best done with copper wire and then soldered, however, tough thread will do provided you bind tightly, use sufficient and cement liberally. Now bolt the u/c straps to former.

The assembly which has now been completed forms a kind of jig on which to line up the fuselage side frames. These should now be cemented in place and the remainder of the bulkheads added. The tail block is fixed in position together with the tail skid support.

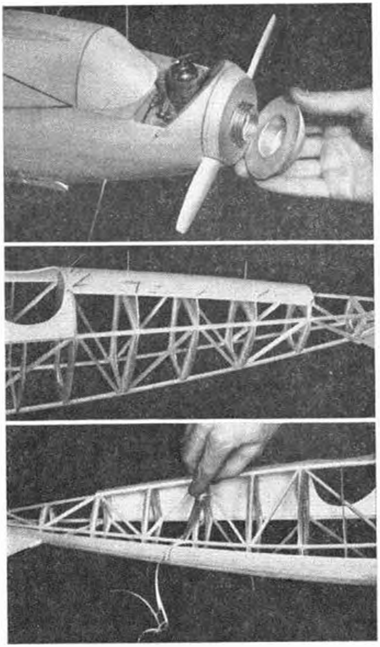
The 1 mm. ply panels are inserted between formers 5 and 6 and the wing cabane struts firmly bound and cemented in position. Make certain at this point that the incidence is correct! *See photo 4 overleaf.*

The lower wing locating pieces F7 and F8 are now fixed in place and the 1/16 in. sheet under-surface is cemented between them onto which is mounted former 9A. The top of the fuselage may now be sheeted with 3/32 in. balsa. Choose a medium soft grade which can be easily curved without cracking. The top decking can be sheeted in three panels aft of the cockpit and three in front, as shown in the photograph. Start by moistening the outer surface of the centre panel. The effect of this is to expand this surface and thus produce a curve. If the resultant curvature is insufficient, a more pronounced effect may be obtained by applying a coat of powerful dope to the inner surface, but don't overdo it!

When the centre panel has been pre-curved sufficiently, pin and cement it in position and when dry, chamfer the edges as shown in order to present a larger surface against which to cement the remaining panels. The protruding corner of the top longerons must now



FULL SIZE COPIES OF THIS 1/6TH SCALE REPRODUCTION CAN BE OBTAINED PRICE 7/6 POST FREE FROM **AEROMODELLER PLANS SERVICE,** PLEASE QUOTE PLAN NUMBER FSP646 WHEN PLACING YOUR ORDER



Photos top to bottom show:—

1. Engine protected against dust by adhesive tape around exhausts and intakes, fitted temporarily in position to check thrustline and spinner alignment. Spinner reveals the screw cap retaining method. 2. First piece of 3/32 in. sheet pinned to top of basic fuselage frame, note chamfered rear edge of cockpit sheeting. 2. Top sheeting completed and showing method of triangulating lower longerons flush with surface of formers. 4. Basic frame prior to fitting nose block assembly and sheeting. Cabane struts are securely bound in position.

be trimmed off flush with the bulkhead surface (see photo). This provides a flat surface and simplifies attachment of the lower edge of the top sheeting. The pendulum bearings and torque rod should be fixed in position before adding any further sheeting.

The nose block assembly may now be added, making sure that the downthrust and sidethrust are correctly incorporated at this point, for it is impossible to make adjustment later.

Add lower sheeting (five strips) and side sheets (two panels each side) using the same bending method as described for the top decking. Build up the removable cowling on the fuselage, *lightly* cementing the pieces in position to enable them to be cut away upon completion.

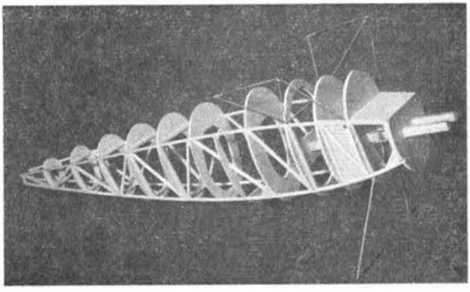
Assemble the dummy engine and make up exhaust pipes. The downward curve of the pipe when viewed from the front must be introduced during the laminating process. This is perhaps a little tedious, but may again be speeded up and simplified by pre-bending the pieces and using a contact adhesive. The rear edge of the pipe comes firmly against the leading edge of the diagonal cabane strut and thus keeps the back of the cowling in place. The cowl may be lifted and slid back under the top wing or completely removed for making adjustments by releasing the spring catch on its front former. The air intakes, etc., are designed for use of the Frog 1·49. The induction tube intake will be unnecessary if a front rotary valve motor is employed.

The tailplane is constructed in two halves and holes are carefully cut in the fuselage sheeting to take the spars which are firmly cemented to the fuselage structure upon insertion.

Wing construction is quite straightforward, use the grades of balsa specified on the plan, and pack up the wing spars with scraps of sheet balsa to lift them into the undercamber, ⅜ in. washout is incorporated in the upper wing T/E at the tip.

Wing strut fixings should be accurately formed. They must not be a sloppy fit, yet must release easily in a rough landing. When the lower wing is knocked *back* the lower end of the strut comes off the front of the lower wing strut fixing and under the influence of the tension on the shirring elastic rigging is pulled up clear of the lower wing and thus the risk of the strut puncturing the covering is minimised.

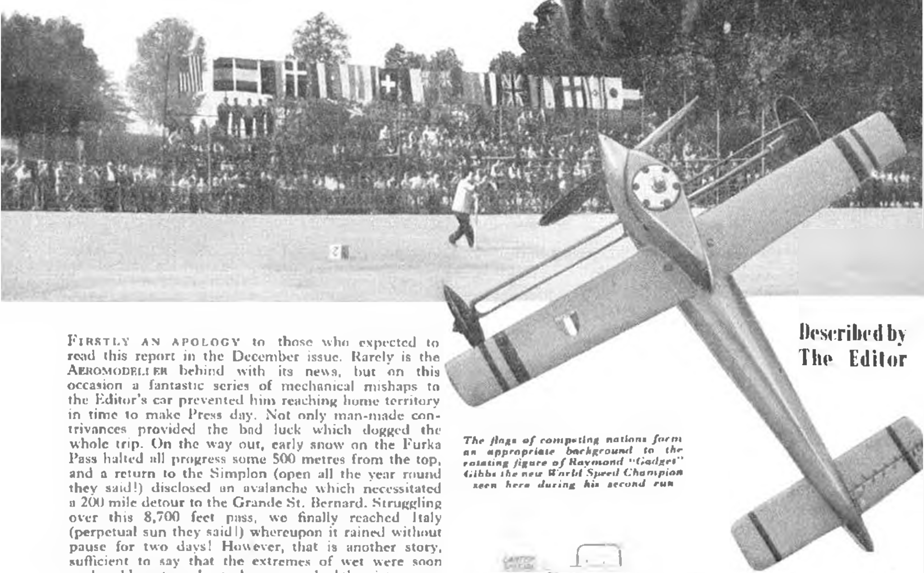
All-up weight should be around 2 lb. The prototype came to exactly that figure and no particular pains were taken to keep the weight down. Double-weight Modelspan was used throughout and dope liberally applied. The flight is very slow and stately, but don't take undue advantage of the fact.



Do not allow the C.G. to drift back beyond the point marked on the plan. Make adjustments to the trim by means of the adjustable elevator a little at a time. This is important, as the control surface is very large and is sensitive to adjustment. It will probably be necessary to use a *little* "UP" elevator to achieve a good glide. Trim for large left circles by offsetting the rudder *slightly*. Start on very low power and build up gradually, correcting trim as you go.

The colour scheme and registration used on the model is authentic and was obtained with the kind co-operation of the Imperial War Museum. Mauve and dark green bands across the upper wing, and tail surface, straw-colour fuselage (varnished ply) metal cowl and spinner, white rudder and light blue undersurfaces.

1956 WORLD SPEED CHAMPIONSHIPS

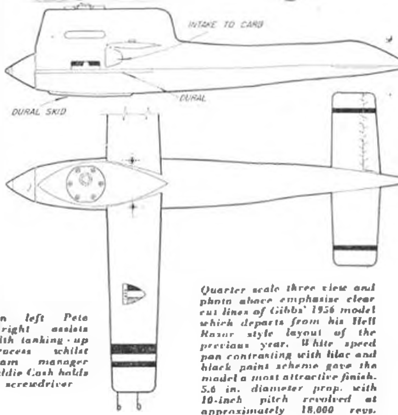


Described by The Editor

The flags of competing nations form an appropriate background to the rotating figure of Raymond "Gadget" Gibbs the new World Speed Champion seen here during his second run

FIRSTLY AN APOLOGY to those who expected to read this report in the December issue. Rarely is the AEROMODELLER behind with its news, but on this occasion a fantastic series of mechanical mishaps to the Editor's car prevented him reaching home territory in time to make Press day. Not only man-made contrivances provided the bad luck which dogged the whole trip. On the way out, early snow on the Furka Pass halted all progress some 500 metres from the top, and a return to the Simplon (open all the year round they said!) disclosed an avalanche which necessitated a 200 mile detour to the Grande St. Bernard. Struggling over this 8,700 feet pass, we finally reached Italy (perpetual sun they said!) whereupon it rained without pause for two days! However, that is another story, sufficient to say that the extremes of wet were soon replaced by intense heat when we reached the picturesque town of Florence, scene of the 1956 World Speed Championships.

Arriving on the morning of Saturday, September 29th, at the Piazza del Cascade, we were greeted by the snarl of high speed motors, the sweet cloying smell of Nitro and Methanol stinging our nostrils as we crossed the generous area of tarmac specially barricaded for the event. The Piazza is situated in pleasant parkland and along one side the flags of competing nations hung limply in the intense heat above a grandstand erected for the benefit of the Italian public. On the other side



On left Pete Wright assists with tanking-up process whilst team manager Eddie Cash holds screwdriver

Quarter scale three view and photo above emphasise clean cut lines of Gibbs' 1956 model which departs from his Hell Razor style layout of the previous year. White speed pan contrasting with lilac and black paint scheme gave the model a most attractive finish. 5.6 in. diameter prop. with 10-inch pitch revolved at approximately 18,000 revs. during his record run of 225 k.p.h.

of the square the Agricultural College of Florence provided welcome shade for contestants, whilst out on the tarmac officials and timekeepers sweated it out in their special "chicken house", which gave a clear and protected view of the two speed circles.

Soon we met the British contingent, headed by Team Manager, Eddie Cosh, comprising "Gadget" Gibbs and Pete Wright plus the glider boys, not forgetting Norman Butcher from our contemporary and Pete Hoskinson, who came along for the ride. The party, together with teams from fifteen other nations, were housed in a very impressive Italian Youth Hostel, set in beautiful surroundings on the fringe of the town. Unfortunately, poor organisation necessitated constant and irritating queuing for meal tickets, and bad catering provided endless lengths of cold spaghetti!

After a morning of test flying the first round of the contest proper commenced in the afternoon, with two rounds to follow the next day. With the atmosphere so hot and dry the thought occurred that speeds might not be high. A thought quickly dispelled by Sladky, the tall well-built Czech, who, suitably attired in shorts, put in the first notable run of 194 k.p.h., which bettered his own winning speed the previous year by 14 k.p.h. This performance was subsequently equalled by three of Sladky's team mates and also Prati of Italy, all four of them tying for sixth place. Prati was flying a special experimental Super Tigre, which sounded terrific, but on his first attempt he ground looped and lost a prop. Unfortunate too, was the Finnish boy Jaaskelainen, whose odd flying style resulted in disqualification for whipping. On his second attempt we judged his wrist well in the pylon, but the judges thought otherwise, so he lost his first flight. Not so observant were the judges when other F.A.I. rules were flagrantly broken. We refer here to the rule which states, that contestants must start their own motors. This was cheerfully ignored throughout the contest by many of the teams, although Messrs. Gibbs and Wright rigidly wielded their own digits!

And "Gadget" wielded his with a vengeance—using the famous Carter Special motor that has stood him so well these past twelve months, he put in a cracking run of 206 k.p.h., a performance which set the pits a-buzzing and brought the crowd to its feet. This terrific run following so soon after Sladky's certainly emphasised the tremendous increase in performance that these top speed boys had obtained since the previous year. Batllo the Spaniard, who can make Super Tigres go faster than the Italians themselves, and who many people tipped as a possible winner, could not get away, and with his balance sheet showing a deficit of two props, failed to record a flight in this first round. Then we espied the lanky figure of Pete Wright making his way to the flight circle. His model was built to the standard of perfection we have come to expect and we doubt whether there was a better engineered model on the field. He was using one of the two Carter engines that Fred Carter had made specially for this event. They were only completed a week or two before the contest and although fast by normal standards, did not equal the performance of the earlier motor used by "Gadget". They employ a Super Tigre crankcase, whereas the older version uses a sleeved down McCoy 19. Pete nevertheless, managed a promising run of 173 k.p.h.

A new motor, the Barbini B.40, made its debut when Cellini of Italy recorded third fastest time in this first round of 192 k.p.h. A really superb piece of Italian engineering, it is glowplug, has front rotary induction, uses two ball races on the main bearing and, believe it or not, employs a minute roller-race big-end bearing.

At the close of this first day's flying, nine out of twenty-nine competitors had failed to record a flight, but with the whole of the following day devoted to the remaining rounds, there was plenty of time for surprises.

Sunday morning seemed even hotter than the Saturday the fierce Italian sun heating the tarmac of the Piazza till it could be felt through the soles of our shoes. There was, however, no time for siestas, for friend Batllo soon made up for his frustration the previous day by clocking 195 k.p.h. with Smejkal and Vydra of Czechoslovakia, running just 1 k.p.h. slower. Cellini and his Barbini decided to liven proceedings up a little more with a magnificent run of 200 k.p.h., which delighted the Italian crowd, who were also entertained by a jet stunt model in the between-round periods. Further entertainment occurred when the jet motor cut whilst the model was inverted, whereupon a

Top left, a view at the line test pit featuring Puschel of Germany and Gogorcena of Spain. Left, view of the judges' "chicken house" with the Agricultural College building in the background. Photos on opposite page: Top, the victorious Czech team working on their models in between rounds. Team Manager Husicka is standing on left. (1) Fernando Batllo of Spain starts his G.20 Super Tigre which was subsequently found to be suffering from a cracked crankcase. (2) The new Barbini B40 shown neatly installed in Cellini's model. (3) Cellini on left holding model with engine designer Barbini on right. (4) Ernie Petit from American Air Forces Europe had persistent trouble and failed to return a score. (5) Amato Prati on right assisted by Barselli, both from Bologna, starting the experimental Super Tigre motor shown in photo (6). (7) Jaaskelainen of Finland on left with yet another G.20 assisted by Rosenlund of Sweden. (8) Vaclav

Smejkal of Czechoslovakia who placed fourth. Note wing tip fairings on model which was constructed mainly of balsa. (9) Naughty, naughty! Baslo starts up for Gogorcena, but was by no means the only offender. (10) Krisma of Hungary has his line checked by Raffaello del Rosso of Florence on right. (11) 1955 Champion, Josef Sladky of Czechoslovakia had a new model this year and also used a new version of the familiar MVVS motor, shown in (12). Designated the S.K. it is much smaller than the MVVS and has differences in the rear induction layout. (13) Hungarian model believed to be Vitkovics which incorporated glo motor built by the flyer. (14) Robert Labarde of France shows the works of his well-engineered model. Motor by compatriot Jarry Vegas is 2.49 c.c. and based on the Carter layout used by Gibbs. (15) Leo Puschel of Germany, on right, used a Japanese O.S.15

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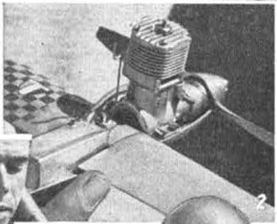

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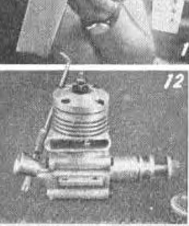

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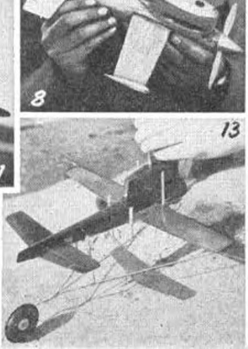

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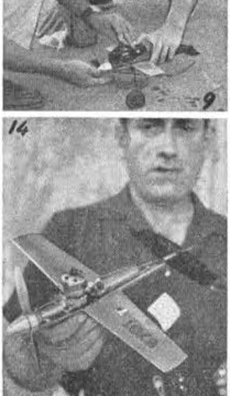

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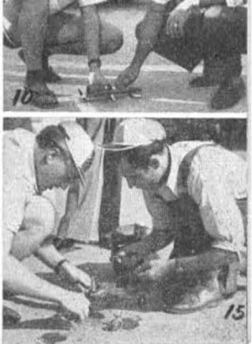

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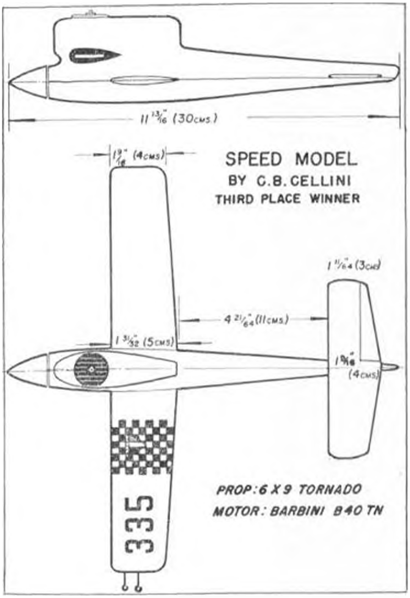
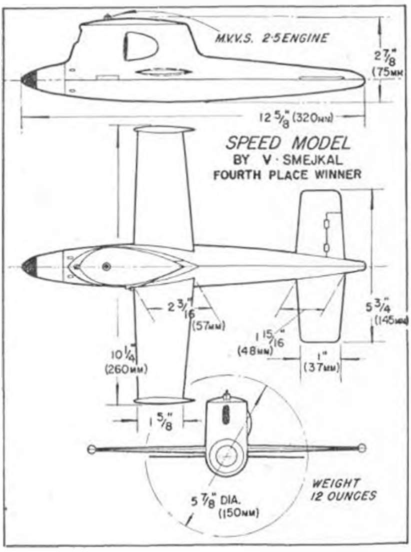


TEAM RESULTS

1.	CZECHOSLOVAKIA ...	Points 584
2.	ITALY ...	„ 579
3.	SPAIN ...	576
4.	HUNGARY ...	„ 575
5.	FRANCE ...	„ 510
6.	GERMANY ...	488



foolish, but well meaning Italian caught it on the glide, to relinquish it albeit hastily when his hand closed upon the red-hot tail pipe!

Once again it was the turn of "Mistair Geebs" as the announcer called him. Complete with entourage of photographers, officials, Pete Wright his helper, and a somewhat harrassed looking Eddie Cosh, who discovered that being team manager to the man with the fastest model, provided additional headaches. Soon we were listening to the delightful howl imparted by the Carter engine as it reaches the 17,000 revs. per minute mark, and "Gadget" was kicking the circle marker number out of his way as he struggled to keep pace with the model. As the run concluded, with "Gadget" tottering on his heels, came the announcement, "206 k.p.h. Inghilterre Geebs!" Well this was identical with the first flight and still another round to go for possible improvement, not that any of us expected it.

The afternoon wore on with flight following flight. Battlo finally got going and showed more of his true form with a speed of 195 k.p.h., which placed him third behind Cellini at the end of the second round. As the light began to fail a breeze sprung up, which cooled the air and pointed to the possibility of faster times. Smejkal of Czechslovakia, quickly displaced Battlo from third position with a fine run of 196 k.p.h., whilst Cellini tried in vain to close the 6 k.p.h. that separated him from Gibbs. Out came the maestro once more to set the seal on his already breathtaking performance, and what a finale he provided, and what a tribute to the genius of Fred Carter. We could hardly believe our ears—"Mistair Geebs 211 k.p.h." In English terms this is 131 m.p.h. an increase of 20 m.p.h. on the fastest time recorded at last year's championships. Truly a tremendous achievement.

But we were not finished with our thrills for Vitkovics of Hungary, who had shown no promise in earlier rounds, came out of the blue (or to be more exact, out of the black, for it was almost dark) to make a splendid effort of 205 k.p.h., thus taking second place.

Then as if for an encore "Gadget" decided to attempt a World Record, changing to thinner lines in his quest for extra speed. We must confess that during the run we could not see "Gadget" himself, never mind the model, but apparently the timekeepers were satisfied as they recorded an identical 16 seconds, giving the astonishing speed of 225 k.p.h., which is being submitted to the F.A.I. as a new world record.

INDIVIDUAL RESULTS

			Engine	*k.p.h.*	*m.p.h.*
1.	GIBBS	Gt. BRITAIN	Carter	211	131·1
2.	VITKOVICS	HUNGARY	BRMV	205	127·4
3.	CELLINI	ITALY	B.40	200	124·3
4.	SMEJKAL	CZECHO.	MVVS	196	121·8
5.	BATLLO	SPAIN	G.20	195	121·2
6.	PRATI	ITALY	G.20	194	120·5
6.	SLADKY	CZECHO.	S.K.	194	120·5
6.	ZATOCIL	CZECHO.	MVVS	194	120·5
6.	VYDRA	CZECHO.	MVVS	194	120·5
10.	GOGORCENA	SPAIN	G.20	193	119·9
11.	BECK	HUNGARY	BRMV	191	118·7
12.	FERNANDEZ	SPAIN	G.20	188	116·8
13.	JAASKELAINEN	FINLAND	G.20	186	115·6
14.	BERSELLI	ITALY	G.20	185	115·0
15.	MONTI	ITALY	G.20	184	114·3
15.	WRIGHT	Gt. BRITAIN	Carter	184	114·3
17.	YLLAN	SPAIN	G.20	180	111·8
18.	KRIZSMA	HUNGARY	Alag VI	179	111·2
18.	JARRY-DESLOGES	FRANCE	Jarry Vega	179	111·2
20.	ROSENLUND	SWEDEN	G.20	177	110·0
21.	LABARDE	FRANCE	Jarry Eega	173	107·5
22.	HORVAH	HUNGARY	Torp. 15	171	106·3
23.	GORZIZA	GERMANY	G.20	166	103·1
24.	PUSCHEL	GERMANY	O.S.15	162	100·7
25.	FROHLICH	GERMANY	G.20	160	99·4
26.	SCHAFER	GERMANY	Webra-glow	159	98·8
27.	HIE	FRANCE	Webra M.1	158	98·2
28.	DELIGNE	BELGIUM	G.20	142	88·2

1956 WORLD A/2 GLIDER CHAMPIONSHIPS

Fred Boxall watched by official photographers and other competitors, launches Bob Amor's model on its fateful fifth flight when a downdraught spoiled a run of four maximums to lose Bob the contest

WHILST THE FINAL rounds of the speed contest were in progress the British glider team, comprising Messrs. Amor, Boxall, Willis and Roberts, in company with competitors from sixteen other nations, were out test flying on Peretola airfield. This is both the civil and military aerodrome serving Florence and a few full size aircraft came in and out during the run of the meeting. Isaac Jacobe the sole Israeli competitor had an unfortunate experience in this respect, when his reserve model landed on the runway at the same time as a Macchi lightplane, to be run over and reduced to matchwood. This was, however, the only casualty of test flying as conditions were ideal and crashes almost non-existent.

Processing that evening, supposedly to start at 8 p.m., eventually commenced some two hours later. Firstly there was a shortage of processors who, secondly, arrived without the necessary equipment. Had the competitors themselves not taken a hand the organisers would have still been processing a week later, as it was it continued until the early hours of the next day. The one bright spot was the system of using small waterslide transfers for processing marks instead of the time-honoured rubber stamp.

By now we were acclimatised to the lack of organisation so when we arrived at the airfield bright and early the next morning it was no surprise to be barred from entry, this in spite of an official pass! However, with this little difficulty eventually overcome we took stock of our surroundings.

It was hot, in fact very hot, with no wind to speak of, and we noted that the mountains which flanked the parched-looking airfield on the north side were almost obscured by haze. To we Britishers such intense heat would normally have meant whacking great thermals, but not in Italy. From the behaviour of the first few models launched it was obvious that miniature thermals, probably only a few feet in diameter, were scattered over the entire field. Most of them were too weak to give any useful assistance, but if the flight path of a model coincided with several of these baby bubbles, then a maximum was assured. It was interesting to note that some of the experienced Continental flyers used a wandering form of trim instead of the normal tight circle normally employed in this country.

Roberts was the first of our lads away, but managed only 1 : 45 with a model that was completely unsuitable for the prevailing conditions. This was an ironic situation when one considers that the self-same layout placed him top in our Trials, which were, of course, held in rain and half a gale. Then Fred Boxall launched and the model sank quickly in a downdraught to barely shoulder height only to pick up one of the baby risers and fly on for 3 : 1. Fred was not without company for in this first round there were 20 maximums which included his team mate Bob Amor.

Touring the various take-off areas we met many old friends including last year's winner Rudi Lindner of Germany flying his 1955 reserve model slightly modified in the way of increased span. What a virtuoso of the towline he is. We watched him running fantastic distances upwind, never so much as glancing over his shoulder and controlling the model entirely by the feel of the line. Other famous participants were the Hansen "twins" from Denmark, Hans and Borge, both with layouts employing dihedralled tailplanes which appear to be a current vogue amongst Danish models.

Also encountered was a Belgian modeller, Meas, whom we had not seen since the days of Eaton Bray International Week, and we photographed as a curiosity the somewhat antiquated model held by his compatriot Brems—a model we were to become more acquainted with at a later stage in the contest.

A lunch break followed the ending of Round Two, and whilst this was in progress came a change in weather.

Left, is Borge Hansen of Denmark who placed fourth. Note pod type fuselage, dihedralled tailplane and close rib spacing on wing

Right, the victorious Czech team with team manager Emil Brauner on left. Models show a refreshing diversity of design and were extremely well flown

A wind blew up from the south bringing with it larger and more pronounced thermals. Inevitably it also produced bigger and better downdraughts, but even so conditions had improved, for we enjoyed 25 maximums in the third round which followed.

Willis of Great Britain caught a beautiful riser, the model landing in a transformer station at the foot of the mountains. Amor, on whom British hopes were now centred, was away after an excellent launch and the model was high up almost overhead when it D.T.'d exactly on the 3-minute mark—which is precision flying if ever there was. Fred Boxall also managed another maximum, although throughout the contest his model was trimmed much too close to the stall for our liking.

There were no unusually new design trends to be seen around the field, such as the reed grass Wakefields seen in Sweden this year. The Russians were not participating and the Yugoslavs were also conspicuous by their absence. Some of the Hungarian models had built-up tissue-covered fuselages which is unusual on A/2's these days. The Czech models were nicely built, varied extensively in design and had that well-used look about them. Just how well they were flown can be judged from the final results and says much for the Czech system of putting their teams through extensive training prior to these international events. The Italians, believe it or not, held their team trials the day before the contest! Bringing fourteen flyers from all over Italy, and using the remaining men for proxies after they had selected the four team members. The proxy flyers in general did a good job, young Zuanelli flying for Wheeler of New Zealand having three maximums at the end of round three, the only man besides Amor in this position.

British hopes were high after Bob Amor scored a fourth impeccable maximum. Flushed with our success in the Speed Contest, and knowing after Zuanelli boobed on his fourth, that no other competitor had more than three maximums we felt Bob's position was unassailable and were already looking forward confidently to a double British victory.

Most of the well-placed flyers were obviously going to fly early in the fifth round and we followed Borge Hansen out to the take-off area with Bob Amor and helpers following close behind. Hansen moved over towards the runway for his launch as he obviously thought that it would be giving off some of the heat absorbed during the day into the now cooling air. After catching a little lift he found a strong downdraught for a time of only 1 : 59. In a somewhat tense atmosphere Bob Amor had launched a few seconds behind Hansen and released overhead in copybook fashion. This we thought is in the bag, forgetting for a moment the old maxim "there's many a slip twixt cup and lip."

There must have been the granddaddy of all Gremlins hovering up there, for the model sank like a stone to record only 1 : 55. We thought that Bob Amor took this crushing disappointment very well indeed, for it is no easy task to keep smiling when, at your first international contest, almost certain victory is snatched away at the very last moment.

(1) Kalen of Sweden flew this striking design which featured sheet covering on the upper surfaces of both wing and tail. Wing section was his own and similar to Sigurd Isacson 63009. Tail section had slight droop at trailing edge. (2) Rudi Lindner with one of his well-known "Spinne" series. Note the tail is in the de-thermalised position proving that even the maestro slips up occasionally. He kept the model on the line too long and D.T.'d well under three minutes

Now, of course, it was anybody's contest and with the absence of a scoreboard a great number of us were running around trying to find out whose! Both Thomann of Switzerland and Kalen of Sweden had maximums in this last round having suffered during the dead weather period earlier in the day. In a contest with so many arresting models and modellers one could still single these two out as possible winners, such was the standard of their flying and the construction of their machines. We also knew that the Czechs were fairly well placed and on the times achieved by the end of the fourth round it was still possible for men down to the 11th position to win the contest.

Finally it was known that Brems of Belgium was the lucky man although confirmation of the top positions was not known until the following day. To add to the confusion there were a number of complaints about inaccurate time-keeping, many of which were to our knowledge justified. This was one of the penalties for not

(3) Zuanelli flew this short-nosed job for Wheeler of New Zealand scoring three maximums in the process. (4) Roser of Hungary with elegant slab-sider well flown into 12th position. (5) Schnabel of Switzerland was little worried about warping his own fuselage being stripped to shorts throughout the event. Greater anxiety was shown for his model as can be seen in this picture

Photos on opposite page: (1) Leppert of Germany launches for his compatriot Papendorf who placed 13th. (2) Fea of Italy, well-known Wakefield flyer, was proxy for Hujikawa of Japan and even wears Japanese style cap and glasses to complete the picture. Model had very generous dihedral. (3) Aubertin of Monaco had unusual model and unusual headgear. Hat is of Yugoslav origin and model proboscis was made from aluminium tubing. To complete international aspect he used the Russian S.K. wing section. (4) Buiter of Holland shows an attractive piece of aeromodelling and used a small strip of balsa glued on leading edge of one wing tip as a trimming device. (5) Posa of Rivini, Italy, on right, shelters from intense sun with Marino Bollini on left. Note turbulator on model. (6) Proxy flyer Semenzato prepares to launch for Carl Hermes of the U.S.A. Model was extremely well built, but placed well down. (7) Italian helper launches for proxy flyer Soave flying for Don Mackenzie of Canada. (8) From left to right, Borge Hansen, Hans Nilsen, and Hans Hansen of Denmark. Protege Nilsen in centre flew very well indeed into 14th place. (9) Model held by team mate belongs to Yedelsky of Austria and features sheet upper surface on wing made from 1 mm. balsa with combination ply ribs. Below, Thoman of Switzerland placed second with this sleek and purposeful A/2

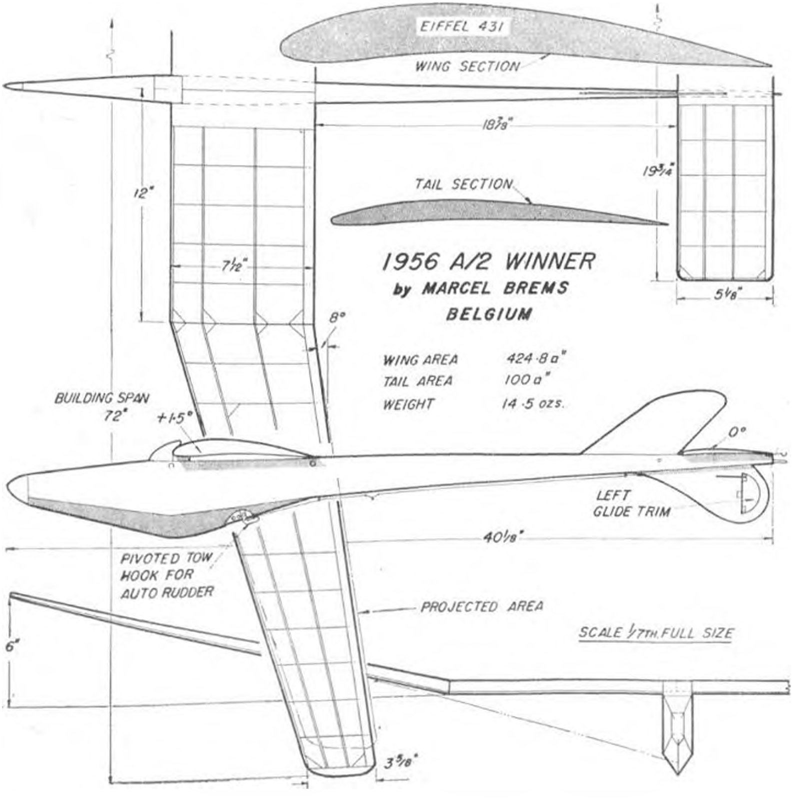
(6) "Tiny" Wilkin of Belgium, holding model, chats with team manager George Lippens, whose odd headgear was a lunch bag inverted! (7) Bearing a considerable likeness to his famous brother Oscar, Kurt Czepa of Austria holds aloft his sheet wing model. (8) Isaac Jacobs of Israel showed a high standard of construction. Model had hardwood boom, braced with ply at weak point, and a balsa nose. Wing section was a Sladky 1912, with drooped trailing edge and the tail used a thin Clark Y. Note forward fin

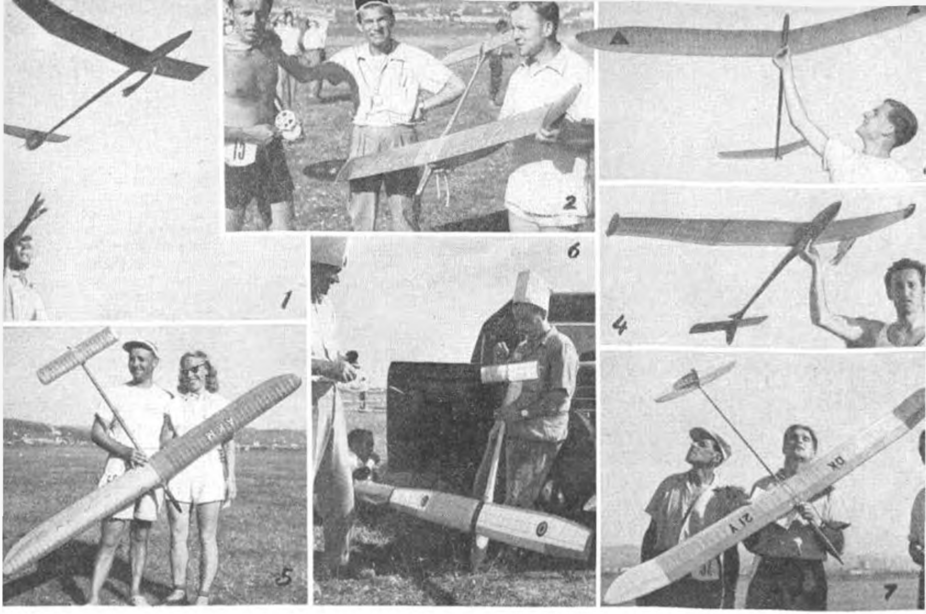
using trained timekeepers, or better still a recorder who checks all watches.

All in all it was not a very satisfactory contest, certainly the best machine did not win. By saying this we do not derogate friend Brems fine performance. His model was well trimmed and flown with great consistency, and in case we should be accused of sour grapes in view of the British disappointment, let us hasten to add that there were far better models than Bob Amor's in attendance. As a model design the winning machine took us back many years and the construction and finish made a mockery of the many beautiful models that participated, so much so that well known flyers could be seen to wince when they came up to congratulate the winner and caught sight of his machine.

However, it takes all sorts to make a world and all kinds of model to make a contest. Who knows? Friend Brems may have started a new trend in A/2 design and we may yet have to eat our words.

Marcel Brems proudly holds aloft the 1956 A/2 champion glider which in this picture is lacking its wing braces





(1) Scardichio launching for Posa of Italy. (2) Spulak of Czechoslovakia on left, with team manager Brauner in centre and Horyna on right. Spulak placed sixth and Horyna eighth. (3) Lindner influence can be seen in this model by Czincel of Germany, held aloft by team mate Hammer. (4) Very elegant model flown by Zalberti of Italy belonged to Wheeler of New Zealand. Note close rib spacing and tin fins. (5) Best looking team manager, or should we say manageress, was Birgit Larsson who filled this capacity for Sweden. Her husband Terge was a Swedish team member. (6) Spanish speed boys turned to peace and quiet of sailplanes, making one entry in the name of Ylion. Model was unfortunately very poorly placed. (7) Swiss team members from left to right are, Hauenstein, Bucher and team manager Arnold Degen. All of them seem to be looking at different models at a great height!

TEAM RESULTS

1.	CZECHOSLOVAKIA	Points	2380
2.	SWEDEN	"	2293
3.	SWITZERLAND	"	2231
4.	HUNGARY	"	2211
5.	BELGIUM	"	2205
6.	DENMARK	"	2201
7.	NEW ZEALAND	"	2165
8.	GERMANY	"	2160
9.	GREAT BRITAIN	"	2071
10.	FRANCE	"	2060
11.	CANADA	"	2050
12.	HOLLAND	"	1993
13.	ITALY	"	1954
14.	JAPAN	"	1807
15.	AUSTRIA	"	1730
16.	U.S.A.	"	1683

INDIVIDUAL RESULTS

			1	2	3	4	5	Total
1.	BREMS	BELGIUM	145	180	180	180	168	853
2.	AMOR	GREAT BRITAIN	180	180	180	180	115	835
3.	THOMAN	SWITZERLAND	139	142	180	180	180	821
4.	HANSEN	DENMARK	180	180	160	180	119	819
5.	KALLEN	SWEDEN	97	180	180	180	180	817
6.	SPULAK	CZECHOSLOVAKIA	155	132	180	167	180	814
7.	JONES, B.	CANADA	81	180	180	170	180	791
8.	HORYNA	CZECHOSLOVAKIA	177	138	142	180	152	789
9.	LARSSON	SWEDEN	86	180	180	157	180	783
10.	HAJEK	CZECHOSLOVAKIA	148	180	180	180	89	777
11.	STEPANEK	CZECHOSLOVAKIA	142	180	125	163	160	770
12.	ROSER	HUNGARY	180	67	180	180	163	770
13.	PAPENDORF	GERMANY	180	147	180	101	157	765
14.	NILSEN	DENMARK	76	180	180	180	141	757
15.	WHEELER*	NEW ZEALAND	180	180	180	111	102	753
16.	GUSSENHOVEN	HOLLAND	102	180	156	137	177	752
17.	LINDNER	GERMANY	180	165	180	114	107	746
18.	TEMPLIER	FRANCE	120	180	180	123	142	745
19.	RODOCZI	HUNGARY	180	180	146	102	122	730
20.	SCHNABEL	SWITZERLAND	152	180	145	105	146	728
21.	SIMON, G.	HUNGARY	180	85	100	180	166	711
22.	GIUSTI, E.	ITALY	74	180	180	99	178	711
23.	WATSON*	NEW ZEALAND	144	138	69	180	180	711
24.	NORBERT	HUNGARY	180	180	73	99	172	704
25.	JEDELSKY	AUSTRIA	100	158	135	180	130	703
26.	TERRILL	NEW ZEALAND	180	64	180	180	97	701
27.	ITO KINZOL*	JAPAN	180	92	180	131	112	695
28.	JOANSSON	SWEDEN	180	167	61	180	105	693
29.	MAES	BELGIUM	66	180	180	119	144	689
30.	ESUELT	HOLLAND	130	180	180	67	131	688
31.	BUCHER	SWITZERLAND	100	180	44	180	180	684
32.	AUBERTIN	MONACO	180	158	85	65	180	668
33.	MACKENZIE	CANADA	109	83	180	154	139	665
34.	BOXALL	GREAT BRITAIN	180	84	180	76	145	665
35.	WILKIN	BELGIUM	93	60	180	180	150	663
36.	GOETZ	FRANCE	126	83	180	164	106	659
37.	GUILLOTEAU	FRANCE	159	94	97	180	126	656
38.	CZINCEL	GERMANY	180	36	104	161	168	649
39.	POSA	ITALY	180	80	180	81	114	635
40.	BILGRI*	U.S.A.	87	134	65	180	165	631
41.	HANSEN, H.	DENMARK	180	97	180	33	135	625
42.	NIRONI	ITALY	180	114	78	101	135	608
43.	JACOB	ISRAEL	104	165	104	78	149	600
44.	HUJIKAWA*	JAPAN	180	84	94	58	179	595
45.	SUGDEN*	CANADA	180	85	49	100	180	594
46.	HAUENSTEIN	SWITZERLAND	100	51	180	119	141	590
47.	HAMMER	GERMANY	104	107	27	168	168	574
48.	HERMES*	U.S.A.	102	72	180	90	127	571
49.	WILLIS	GREAT BRITAIN	130	100	180	54	107	571
50.	ROBERTS	GREAT BRITAIN	105	54	124	123	105	511

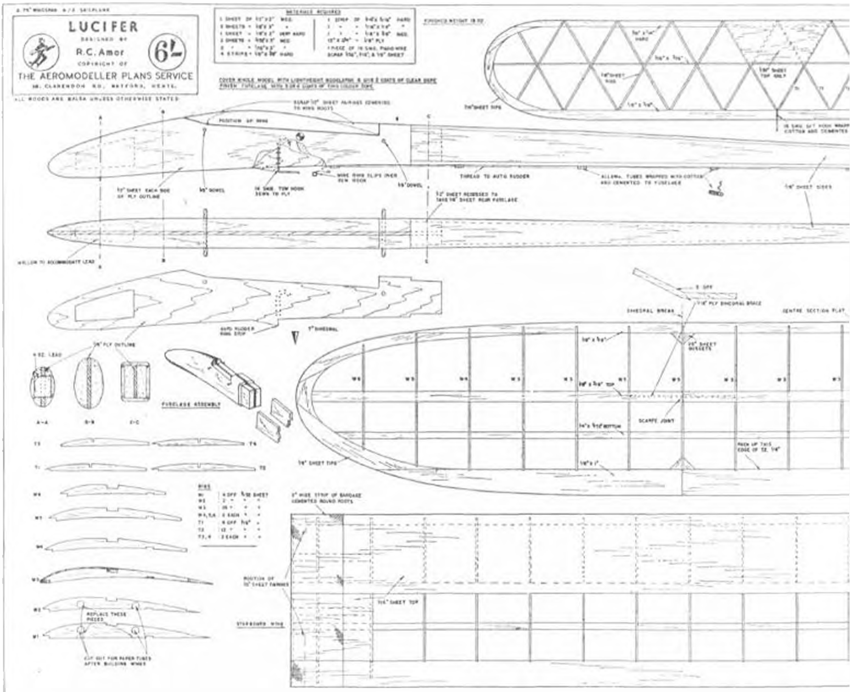
** Indicates Proxy Flown. 66 entries.*

Build Bob Amor's World Championship class A/2 that

BOB AMOR'S IDEA of the ideal A/2 layout is Geof Lefever's "Altair" described in our September, 1955, issue. Geof and Bob, by the way, are aeromodelling pals so it is quite natural that "Lucifer" follows the design trend of the now famous "Altair". The idea was to retain the good towing characteristics and reliable performance and at the same time improve the actual sinking speed of the model. To do this, fuselage size was reduced to an absolute minimum and as smooth an entry as possible was obtained. The thin Benedek 6356b section was employed on the wing and the chord increased to make it more efficient. Final result is a model which does in fact go up on the line very well, providing it is not towed too slowly to start with, and the sinking speed is about the best of any model Bob has made so far. Normal trim is a fairly tight left circle, this of course, is essential for competition in windy weather, for the purpose of remaining in sight.

At the World Championships in Florence, the air was very hot and dry and almost dead calm. The only alteration to the trim was to open the circle progressively on two or three test flights previous to the contest, until the model was just trimming off the stall and executing about 100 ft. diameter circles. Thermals were weak and patchy, but the model made the most of what lift there was.

Trimming should present no difficulty to any experienced modeller, providing the wing incidence, centre of gravity and tow hook position are correct. If any warps develop when the structure is doped, these should be carefully removed before attempting to test fly. Make gradual adjustments to the auto rudder as it is quite sensitive on the turn trim.



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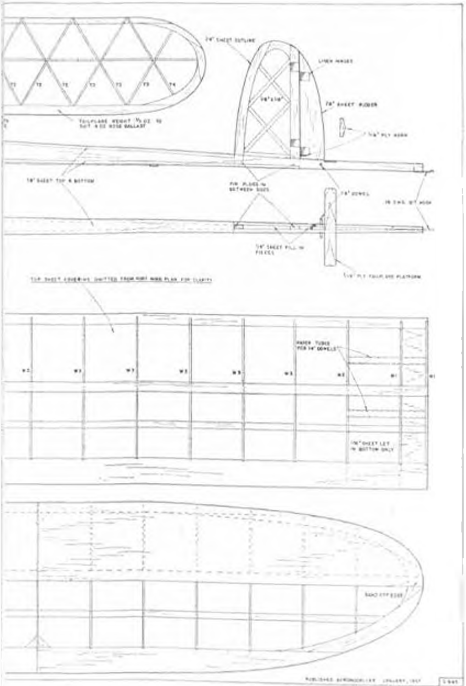
Lucifer

placed 2nd in Florence

Bob Amor, on right, displays the attractive and purposeful lines of "Lucifer" in front of the control point at Paretola Airfield prior to his last flight. Below, Irwin Wannup, a Scottish aeromodelling visitor to the contest, assists Fred Boxall in fusing up "Lucifer" prior to launching



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Construction

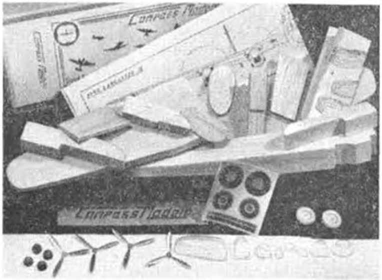
The wings are straightforward except for the joining dowels. Paper tubes are wound on the dowels and then cut in half although left in position. After the leading edges of the wings have been sheeted they are put together on the building board and the remainder of the top wing sheeting added all in one piece. The wing is then turned over as a whole and the ribs are cut into from the underside and the paper tubes with the dowels inside are firmly cemented into position. The sheeting to the underside is added and when completely dry, the two wings are parted by cutting through the sheet. A strip of two-inch wide bandage is cemented round each wing root before covering to strengthen up the whole assembly. The tailplane and fin should be made as light as possible.

Fuselage construction is very simple, but the sheet for the boom should be carefully selected for strength without being too heavy and care must be taken to get the boom absolutely straight. The lead ballast should be cast in a box made of scrap balsa, and when the box has been removed, make it a force fit in the plywood keel.

Cover the model in lightweight Modelspan and dope with glider dope, two coats for the tailplane and fin. Finish the fuselage with repeated coats of thin coloured dope, sanding between each one until a high gloss finish is obtained.

Trade Notes

Compass Models kit for wartime Lancaster includes moulded canopies, profiled parts, plan and other accessories



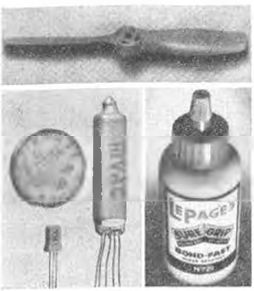
FIRST, FROM THE red face department corrections of two errors in the December feature for which we duly apologise. Builders of the **Contest Kits** *Calypso*, should be warned that this design is *not* suitable for the AM.25 as we mentioned, it was specifically for engines of AM.10 calibre. Secondly, the plastic model *Hawker Hunter* by **J. & L. Randall Ltd.**, retails at 12s. 11d. and *not* 12s. 6d.

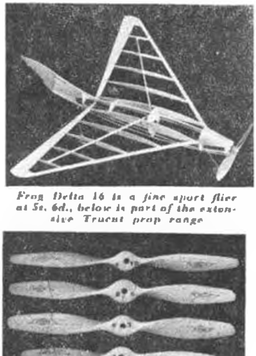
Continuing on the plastic theme, two new ranges of propellers are announced this month and a third will be shortly following from another, entirely new source. First from **Keil Kraft** we have tested the 8 x 4 high impact propeller, in silver plastic, which retails at the remarkably low figure of 1s. 3d. 6 x 4 and 7 x 4 sizes are to follow at similar competitive prices. These props. are flexible to a degree, but not "unbreakable" like the famous Truflex range, but who can complain at such a price? Like the Frog range, the Keil Kraft propellers have hollowed hubs which make for easy moulding and greater hub strength with minimised possibility of hidden air bubbles and root fractures.

New **Frog** range starts with a most attractive 5 x 6, specially for control line and perfect for small designs such as A.P.S. *Cessna* 310. These are in high impact polystyrene and nylon at prices ranging from 9d. and 1s. 6d. upwards. Continuing sizes will be 6 x 6 and 7 x 4.

Wooden props. still have a keen following and the extensive range manufactured by **P.A.W.** from 5 x 3 up to 14 x 6 including a pusher 7 x 5, remains popular, both in this country and overseas. The majority of competition fliers prefer to use a wooden prop. as they do have the edge over the plastics for ultimate efficiency. We are pleased to see that P.A.W. **Trucut** airscrews include 3-in. pitch in all sizes up to 8-in. diameter and in fact, there are no less than nine different pitches available in 7-in. and 8-in. diameters which retail at the very favourable figure of 1s. 11d. each.

Frog 5 x 6 prop, Hivac XM.1 valve and Le Pages Sure-Grip Glue are three entirely new items this month





Frog Delta 16 is a fine sport flier at 5s. 6d., below is part of the extensive Trucut prop range

Compass Models manufactured by C. P. Dixon of King Street, Southport, sent along an example of their larger solid model range, for the Lancaster, which retails complete with all canopy mouldings, transfers and carefully trimmed and profiled blocks for 14s. 0d. The only missing item in this kit is the wire for the undercarriages and a tailwheel. The range includes a wide selection of W.W.II types with prices from 2s. 6d. upwards, all to 1/72nd scale.

Electronic Developments will go down in modelling history as being the first manufacturers in this country to market a Transistor receiver known as **Transitrol**, selling at £6 6s. 6d. including tax. An XFG1 valve is used as a detector in a low current circuit and increased valve life is claimed, coupled with all advantages of a multi-valve modulated receiver, together with simplicity and very low receiver battery size and weights. The unit is entirely enclosed in a plastic box, having a separate multi pin plug for battery connections. With a current change from 2 Ma. idling, up to 4 Ma., it will soon be recognised as a very popular and reliable Rx.

Coincident with this announcement by E.D. comes a news flash from **Hivac Ltd.**, who have recently introduced two components specifically intended for use in stable and long life radio control circuits, available from January 1st, 1957.

One is a subminiature directly heated hard valve, having a cross section of only about 10 mm. by 8 mm. and an overall length of about 38 mm. It is a radio frequency valve, suitable for operation in the orthodox types of super-regenerative circuit. It had a filament current of only 50 Ma. at 1·25 v. and it will operate satisfactorily from an H.T. supply of 30 v.

The type number is XM.1and the retail price is only 13s. 6d. each plus 2s. 9d. purchase tax. The second type is a new, very small junction transistor, particularly suitable for D.C. amplification in radio control circuits. This small transistor has a retail price of only 18s. 0d. plus 3s. 8d. each purchase tax. The type number T.M.1.

Readers owning **E.C.C Telecommander** radio control equipment should note that the Company manufacturing same is no longer trading. The premises at Bury House, Ruislip, are closed and equipmen for servicing or repair should be sent to Mr. George Davie of 7 Davidson Road, Thorpe, Norwich.

Humber Oil Company Limited announce the introduction of an entirely new form of paint pack. This contains six intermixable colours of **Humbrol** Art Oil enamel, packed in a cellophane packet with full instructions and directions for use on the cover. The paints are superb for plastic kit models and will retail at 1s. 3d.

Visiting the new **Davies Charlton** Isle-of-Man factory recently, we found all their popular range of engines in full scale production and understand that a new hot-stuff 2·5 c.c. diesel will be along very shortly. They are also working on a new 1 c.c. engine, especially for the novices, which is being designed for easy starting.

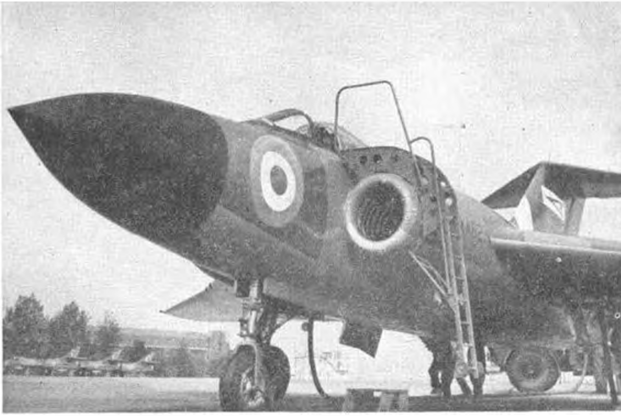
Also comfortably esconced in a new factory at West Moseley, are Messrs. Electronic Developments, who are shortly producing a new 1·5 c.c. with twin ball races and rear reed induction. Yet another project is a new version of the famous 2·46 "Racer", which is at least 1,000 revs. up on the current model.

New from Hull is a Tissue paste in new tube colours, and novel Humbrol art oil pack for plastics

Aircraft in Service

The

Gloster Javelin



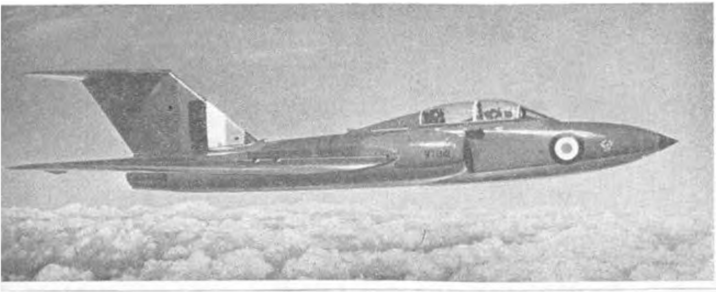
by G. A. G. COX

CONCEIVED AS A PROJECT in 1948, first test flown in 1952, and accepted for Squadron service in 1956, Gloster's Javelin has had more than its share of unwarranted criticism. Despite the tardy flow of progress from design board to R.A.F. runways, the Javelin stands as one of the World's most efficient all-weather fighters, and as a gun platform for its four 30 mm. Aden cannon, or future guided missiles, it ranks as Britain's foremost night fighter. One Squadron which has been responsible for "working up" the Javelin in service trials is number 46, based at Odiham in Hants, and it is due to the kind co-operation of the Commanding Officer and Air Ministry, that we are able to present the detailed plans overleaf.

With twin Armstrong Siddeley Sapphires of 8,300 lbs. thrust apiece, the high thrust/weight ratio endows it with a short take-off and a very rapid rate of climb to heights in excess of 50,000 feet, where it is possible to cruise at high mach. numbers. During the climb, cockpit pressure and temperature is automatically controlled, while the extensive array of search radar and other navigational equipment enables earliest possible interception of any intruding aircraft. In test exercises, notably "Operation Beware", Javelins made interceptions of high flying Canberras more than 100 miles from the British coast.

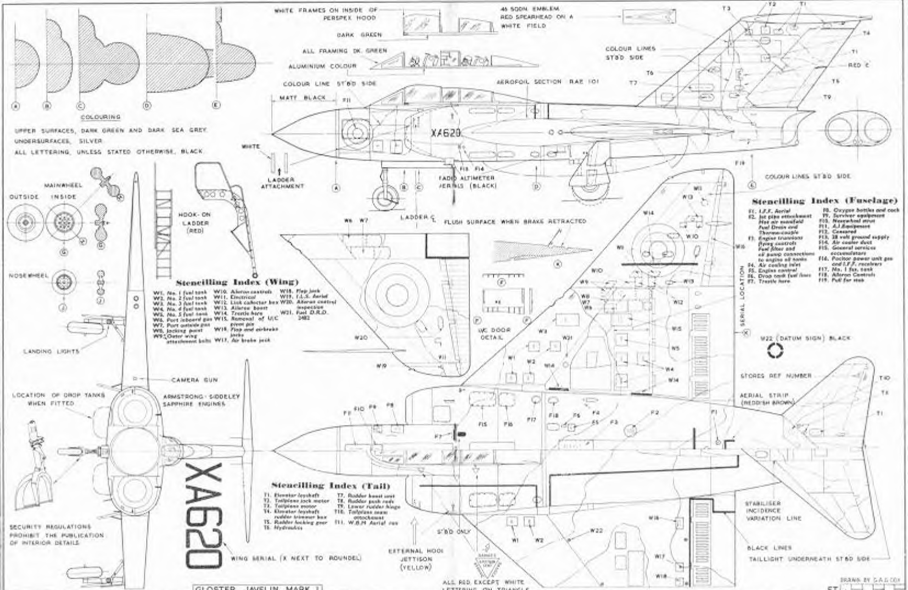
In its original form, as a project for the Metropolitan Vickers F.9 turbojet, which became the Sapphire, the Javelin was an extremely handsome delta which might have carried four or six 3·7 or 4·5 in. recoil-less guns. The prototype was not equipped for this armament and more conventional cannon were fitted eventually to the 3rd prototype. In competition with the D.H. 110 it gained a valuable M.o.S. contract, and after a lengthy series of development tests, the first of several major modifications was revealed in 1952. This involved a change in wingtip form, reducing effective sweepback and providing better wing lift throughout the speed range. Cockpit canopies, nose radome and tail fairing shapes have each in turn been subject to design changes, while a completely new variant with thinner wing and powered by two Bristol Olympus engines with "still more advanced electronic and guided weapons system" was started as a development batch of 18: but eventually axed from the M.o.S. programme.

46 Squadron has the Javelin F.A.W. Mk.1, and it is presumed that the second Squadron to be equipped, No. 29, will also have this version. The F.A.W. Mk. 4 is distinguished by its all-flying tail with geared elevator and an aileron trailing edge thickness of 2 in. for greater effectiveness. Almost identical is the F.A.W. Mk. 7, which has provision for streamline missile carrying fairings and larger jet intakes and effluxes. Completely revised is the T.3 version and its 60 ft. 2 in. fuselage, which imparts a more slender appearance despite the humped cockpit canopy as seen below. Dimensions of the F.A.W. Mk. 1 are: Span, 52 ft., length, 67 ft. and height, 17 ft. 1 in.



Heading shows a 46 Sqdn. Javelin being refuelled at Odiham: note special ladder, painted nosedome and Sqdn. insignia on fin (AERO-MODELLER photo). Left: the prototype T.3 Trainer, with taller canopy and longer fuselage. Bulge at side is a forward viewing periscope for the instructor. (Russell Adams photo)

See page 48 for drawing.



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World News

Canadian modellers have a reputation for forthright comment, and quite what they will say to the '56 F.A.I. Models Commission decision for next year's programme and power model specifications, we shudder to think. Certainly the Montreal M.F.C. went to town through its regular newsletter in condemning the proposal that 1·5 c.c. should be the new motor size for Internats., and they'll be relieved to see that this proposal did not go through. In the same newsletter, under the heading of "That Motor", the AM. 10 diesel gets a boost from Canadian Dave Thurber of Ottawa, who says, "This is one flat-out, evermore, living BOMB", which is a compliment one cannot overlook. He advises an 8 x 3 or 7 x 4 prop for free flight. Eastern Canada had its first open meeting on September 16th (all events completely unrestricted) at Gananoque and drew the greatest turnout of spectators and contestants ever seen in that part of the country. Sorjo Ranta had a field day by taking 1st in Rubber (8 : 59) and Chuck Glider (3 : 24) with a 2nd in power and 7th in Glider. Sarge's power model had a McCoy ·09, while the winner, Howard Day, used a McCoy 29, which just goes to show how a little 'un can compete on even terms with the giants when no restrictions apply.

Outstanding news from the **U.S.A.** is that the Nordic A/1 class is officially adopted as the "limited" glider size. Correspondents tell us that it was largely due to an AEROMODELLER feature that the A/1 came to the attention of American enthusiasts—good show! A new outright duration record of 34 hours, 34 minutes has been set by a four-man team, a Kenhi Cougar, a Johnson 35, and about fifteen gallons of Ohlsson "Gold Seal" fuel. They had a few false starts (one began at 2 a.m. and was halted by the police following noise complaints) and had to fly through a storm and strong winds to set this marathon figure. Southern California must have been relieved when the controliner finally came to earth.

An International contest that could not be supported as well as it deserves, because of financial commitments in most countries, was the 1956 Europakriterium, to give it a Swiss-German title, for the Yugoslavian cup. Held at Subbotica, close to the Hungarian border, it offered a direct comparison of Soviet modelling performance with some of the best power fliers from **Switzerland** and **Yugoslavia,** and ended in a tied victory for Vladimir Petukov of the **U.S.S.R.** and Josef Kun of **Hungary,** with five maximums and a fly-off time of 5 : 27.

Remembering that Ron Draper's fly-off time was 5 : 20 in the World Championships at Cranfield.

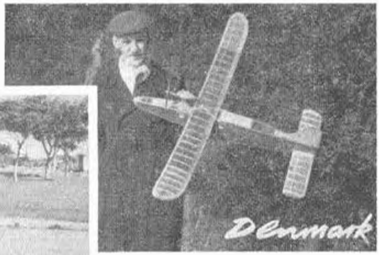
Top: Winter scene as Czech competitors in a slope-soaring R/C event at Vrchlabi in the Bohemian mountains, prepare to fly a "Fakir" design. Central: Convair 340 in Luft Hansa colours for two .8 c.c. Webra Piccolos by Dr. Helmut Ziegler of Cologne, has retracting undercarriage. Bottom: International flyer Takeo Asano whose proxy-flown model did so well at Cranfield—sends autographed greetings

Right: A scale Douglas DC-3 in Swedish colours was built by Lars Lundell of Bromma from Japanese plans. Fuselage is pine covered, wings have a .8 mm. ply skin, yet the overall weight is about the same as for a balsa model. Young lady goes by the name of Majy. Below is another scale c/liner, a Curtiss Hawk fighter by A. Tornatore of Italy. Model has cable controls as on the full-size

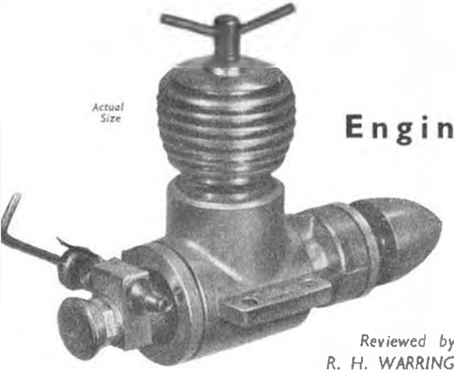
these durations afford interesting comparison, made all the more fascinating by the fact that Emil Fresl of the host country was 4th with 14 : 13 secs., while at Cranfield he held the same position with 14 : 57. Third place man was Ezven Kucerov, Russian maestro of the ultra long fuselage. Best of the Czechs was Vladimir Hajek at 6th with 13 : 50, and top Swiss was Rudolf Schenker (11 : 10). Team victory went to the Russian contingent, so surely this should mean participation of the Moscow men at the '58 World Power Championships.

It was blowing a gale, as usual, on September 16th in **Denmark.** But this did not deter the Glider, Wakefield and R/C boys from flying, and some of the hardy **Swedes** came across the water from Malmo, all to compete for the South Zealand Cup. Full results are not quoted, radio being a victory for Jan Hacke and his three channel control *Lazybones.* A month later, on October 14th, the Cologne club in **Germany** were hosts to R.A.F. Wahn and Dusseldorf for a triangular match. The R.A.F. lads did not do too badly for the old country, flying to 7th place in A/2 and 10th in power, and they returned to camp with bags of goodwill and a couple of bottles of wine thrown in for good measure.

Jarry-Desloges is now firmly established as the speed king of **France**, now that he has won all the three classes at the French National speed contests, and moreover, with engines of his own design and manufacture. He works at SNECMA, the aviation engine factory which has produced a number of fine power plants for full-size aircraft, and doubtless this has helped considerably in the production of his remarkable long shaft 2·5, 5 and 10 c.c. engines. There are many who say that if only Jarry would add a little wing area to his models, he would give the topliners something to think about.



Above: Entered in the South Zealand Cup for R/C, but not flown due to gale force winds, was this novel high thrust design by J. M. Larson. Looks like a Wakefield with a power pod and rudder control! At left: Group of Saigon enthusiasts with their mixed bag of C/L scale and team racers. At rear of back row is a Minicab, a fine scale subject for free flight



Actual Size

Engine Analysis No. 29

the TAIFUN HURRIKAN 1.48

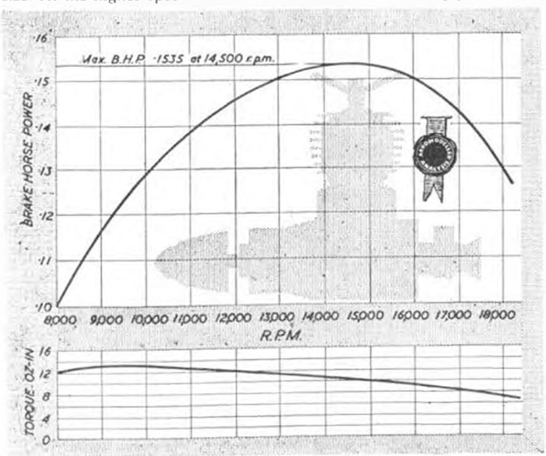
Reviewed by
R. H. WARRING

THIS NEW GERMAN engine ("mit flatterventil" or clack valve) is from the same stable as the "Tornado", "Rasant" and "Hobby". It is a bit heavy for a 1·5 c.c. unit, but its performance at the upper end of the speed range is quite fantastic. Although its peak speed, as tested, was slightly below 15,000 r.p.m., it continued to start easily and run happily and steadily well past the 20,000 mark and would appear to be capable of running almost indefinitely at these speeds.

Since the engine is perfectly symmetrical—both geometrically and from the intake timing point of view (because of the clack valve)—one would expect the "Hurrikan" to start with equal readiness in either direction (which it does) and also to have a similar performance running either way (which it does not). This latter feature is rather puzzling, but there is a definite drop in r.p.m. with the engine running clockwise on any propeller size. At the higher speeds this rev. loss is as much as 1,500 to 2,000 r.p.m. It is not a case of better scavenging with the slipstream playing on the cylinder since there is no loss of speed running anti-clockwise if the cylinder is fully shielded. Thus for "pusher" application, the "Hurrikan" would appear to suffer an inevitable power loss, unlike other reed-induction motors.

The "Hurrikan" has a fair "bite" when hand starting with the smaller propeller sizes and is also likely to start backwards unless the propeller is flipped quite hard. But starting characteristics throughout are excellent. Finger choking is adequate and, with the compression backed off slightly, starting is virtually instantaneous, hot or cold. Both the needle valve and compression setting get progressively more sensitive as the speed increases, but for normal operating, speeds can be regarded as non-critical. The engine can be "throttled" quite effectively with the compression screw and/or richening the mixture, the former method being the easiest and most positive. It can be throttled back at extreme speeds—e.g., from 20,000 r.p.m. to a matter of some 5,000 r.p.m.—with careful adjustment.

The clack valve seals effectively at all speeds (although on two of the engines received, there was a fair amount of blow back through the induction pipe, this being due to faulty valves). The



SPECIFICATION

Displacement: 1·512 c.c. (·0923 cu. in)
Bore: ·507 in.
Stroke: ·457 in.
Bore/stroke ratio: 1·11
Weight: 3·8 ounces
Max. power output: ·1535 B.H.P. at 14,500 r.p.m.
Max. torque: 13·4 ounce-inches at 9·500 r.p.m.
Power rating: ·105 B.H.P. per c.c.
Power/weight ratio: ·04 B.H.P. per ounce

Material specification:

Crankcase: light alloy pressure die casting
Cylinder: hardened steel
Contra-piston: hardened steel
Piston: cast iron
Connecting rod: dural (machined from solid)
Crankshaft: hardened steel
Bearings: two ball races
Cylinder jacket: dural (anodised green)
Spinner nut and propeller driver: dural
Induction: reed valve
Valve unit: machined from dural
Spray bar: brass
Manufacturers:
Johannes Graupner,
Kirchheim-Teck, Germany.

Note: *This engine is not imported into the United Kingdom.*

contra piston fit, hot or cold, is excellent—firm, yet smooth and easy to adjust.

The crankcase unit is a nice clean die-casting, carrying substantial and longer-than-usual mounting lugs. Since the engine itself is not excessively long, this means a really good mounting. The ball races, which are a press fit into the crankcase, are of lightweight type with the outer rings thinner and wider than commonly employed on British engines. The balls are thus relatively large and few in number, assembled in a bronze cage.

The hardened steel crankshaft is 7 mm. dia. (·275 in.) at the rear, stepping down to 5 mm. dia. (·197 in.) at the front. The shaft is a very tight fit in the inner rings of the ball races. The propeller driver is forced onto a slight taper on the front of the shaft (·005 in. taper), ending up against a shallow shoulder to lock the assembly with no fore and aft play. The threaded length of the crankshaft is 4·5 mm. D.I.N. standard, actually ·178 in. dia., which is just that little bit smaller than 2 BA. We feel that, especially with export in mind, 2 BA. would have been a much happier choice as BA. nut sizes are readily obtainable in most countries, whereas German metric threads are not.

Another criticism here concerns the propeller driver itself. The boss is machined to ½ in. diameter, which is a prohibitive hole size to drill in small propellers to fit. It would have been much better to have reduced this to ¼ in. dia., say or have eliminated it entirely. But both these are minor points. In similar vein, we found that the tommy bar supplied with the engine for tightening the spinner nut was too large in diameter to pass through the hole in the front of the spinner,

The cylinder is a really sturdy piece of work, screwing into the crankcase and sealing against a copper gasket around the bottom edge. This, of course, lengthens the "escape path" of any gas leak, which has to traverse the threaded length and is better engineering practice than sealing with a gasket at the top of the crankcase unit. The manufacturers also believe in assembling their cylinders really tight. Of the specimens tested, we just could not get one of them apart.

Propeller — R.P.M. Figures

Propeller dia. x pitch	r.p.m.
9 x 4 (Stant)	8,200
8 x 5 (Stant)	10,300
8 x 6 (Stant)	8,250
8 x 4 (Stant)	11,400
7 x 4 (Stant)	12,800
7 x 6 (Stant)	11,200
6 x 4 (Stant)	15,400
6 x 3 (Trucut)	16,900
6 x 4 (Frog nylon)	18,300
8 x 5 (Frog nylon)	10,000
8 x 6 (Frog nylon)	8,800

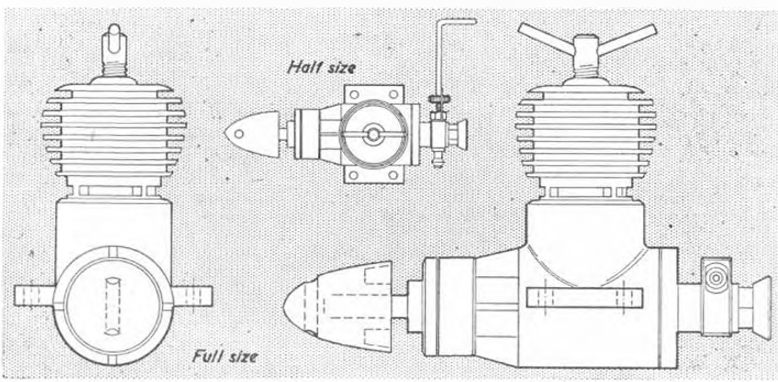
Fuel used: Mercury No. 8.

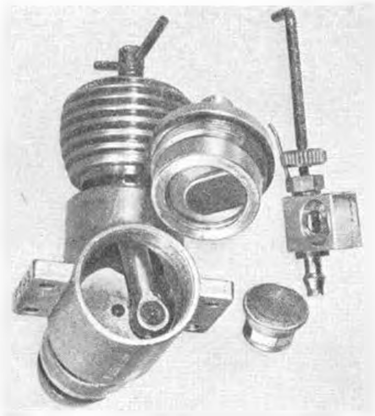
The threads on the outside of the cylinder are rather rough, but a good fit. The threaded upper portion (onto which screws the cylinder jacket) is of reduced diameter.

Porting is quite conventional. Four by-pass ports are machined on the inside of the cylinder, terminating well below the exhausts. The exhaust ports are disposed symmetrically and circumferentially.

The contra piston—mentioned earlier as having an "ideal" fit—appears to be of hardened steel. The piston is of cast iron; quite a solid, heavy affair, with a conical top, but an excellent fit in the cylinder. The connecting rod is machined from bar, big end bearing diameter being 4·5 mm. (·176 in.) and gudgeon pin diameter 3 mm. (·118 in.) The latter is rather on the small side, judged by conventional practice. Fits at both ends were excellent.

The cylinder jacket is turned from dural and anodised pale green. The threads fit quite tightly and there was no tendency for the jacket to unscrew during any of the test runs. The compression adjusting screw threads through the top of the jacket, this part being chemically blacked for finish. The spinner nut is anodised the same colour





"Clack" valve induction is a direct copy of the L. M. Cox system, even to the gauze air filter screening over intake, see other view for assembly

at the cylinder jacket and the rest of the external surfaces remaining as cast (or machined).

The clack valve unit can be detached by unscrewing the backplate. The valve head projects quite some way into the crankcase, the reed valve itself being locked in place by a press fitted cap. A side-mounted spray bar has a single hole facing inwards into a groove machined in the intake tube. Passage to the inside of the tube is provided by four small holes drilled through the bottom of the groove. Thus by slackening the filter unit (which acts as a nut to lock the spray bar unit in place), the needle valve assembly can be rotated to any convenient position and tightened up in this position. The needle valve itself has a simple wire ratchet for locking the adjustment.

Summarising, the "Hurrikan" is an engine with exceptionally good power output and consistent running over a speed range of below 8,000 r.p.m. to above 20,000 r.p.m., according to load. The generous size of the cylinder walls undoubtedly minimises distortion, which could be a major reason for its good behaviour at all speeds. The use of ball races, of course, minimises crankshaft bearing friction and so, as one would expect, the peak speed is somewhat higher than with plain bearing engines of comparable size. The torque curve is particularly flat and possible power output at the upper end could be boosted somewhat by experimenting with different fuels to realise its full potentialities as a racing engine.

The general conception of the engine is up to the usual high standard one has come to expect from German productions, but the "Hurrikan" is apt to be badly let down on details. Of the three engines examined, two suffered from a badly seating valve, with consequent severe loss of performance; one had a somewhat "chewed up" con. rod machining; and one, badly cut exhaust ports. The best of the three was free from any major fault and unless closer inspection is maintained, some "Hurrikans" may not come up to the standard set by this test model. Finally, whilst commending the manufacturers for including a pair of attractive transfers in the box, we would suggest that these be "handed"—otherwise one of these decals will be "flying backwards" when put on a model!

What's the Answer?

The Stonebury Park Club members built American designs, characterised by the c.g. of the models being on or even behind the trailing edge. Their local rivals prophesied that with the wing and tailplane rigged at the same incidence, they would come to grief. Events proved the latter right. All the Stonebury Park models, sooner or later, tucked their noses down and dived in, but it had left everyone puzzled as to how those original designs could have been successful in the first place.

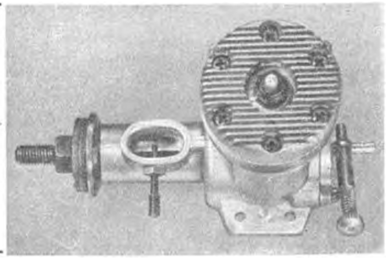
What would YOU do in a case like this! Think a moment, then twist this page for the solution to the problem printed below.

ANSWER: Lack of longitudinal dihedral (i.e., a difference in incidence between wing and tailplane) as *rigged* is now necessarily a dangerous feature. The tailplane is influenced by the downwash from the wing, which means that the airflow is deflected downwards behind the wing at an angle roughly equal to one-half of the wing angle of attack. Thus flying normally with the wing say at 8 degrees angle, of attack and wing and tail at the same rigging incidence, the tailplane would effectively have an angle of attack of only 4 degrees. That gives the necessary longitudinal dihedral for stability.

The snag is if the model drops its nose for any reason and the wing angle of attack is momentarily reduced. The downwash is automatically reduced and so the tailplane becomes more powerful, tending to push the nose down still further. Such models can be tricky to handle and are best left to the experts. But properly flown they are more efficient than their safer counterparts.

Know Your Engine

PART 8: COOLING



Very closely machined head fins on this motor make it an exception among glowplug units. Fastest, and most powerful of all plain-bearing 5 c.c. motors, it has an enormous intake port, requires pressurised fuel supply — can you name it? Answer at foot of next page

WITHOUT EXCEPTION, model aero-engines are designed for air cooling and are seldom critical about this particular requirement. That is to say they will run satisfactorily over a wide range of temperature with little difference in performance, provided the "standing" heat is not so high as to cause distortion of the cylinder or burn or "carbonise" the oil in the fuel mixture so that its lubricating properties are destroyed. High surface speed will also break down castor oil, but not Castrol 'M'.

There are three sources of heat generation when the engine is running—rubbing friction between the moving parts, heat generated by compressing the gas mixture and the heat given out by the mixture when fired. Theoretically, at least, this flame temperature is subject to cooling as the gases expand and escape through the exhaust, but the residual heat is still quite high and the overall heating effect pronounced.

Thus in the complete engine the cylinder, and particularly the top of the piston and upper part of the cylinder, is subject to the most heating.—*Fig.* 1. Friction heat should be tolerably low. Excessive friction means bad running fits and these are to be avoided. In the case of new engines set up on the "tight" side, this condition is relieved by running in which is a process of wearing down to size and "fit" under controlled conditions, *e.g.*, not letting the frictional heat become excessive by limiting the speed and duration of the initial runs. Thus the friction of a main bearing should always be low so that the bearing continues to run cool, and thus does not require any particular form of cooling. If it does run hot on any one point it is quite likely to burn away the lubricating oil film at this point, increasing local friction (and local heating) still more until partial seizure can occur. If this condition is suspected when the engine is running, dousing the outside of the bearing with a liberal dose of coolant (*e.g.*, pouring fuel over it) will often momentarily relieve the trouble. But the real cure in this case is not improved cooling but a better running fit (*see* previous article on fits and tolerances).

The cylinder, on the other hand, normally receives unequal heating. Frictional heat, again, should be quite low and normally a negligible part of the total heating effect, provided there is adequate lubricant in the fuel. The practice of relieving the cylinder bore at the bottom part of the stroke to reduce friction is far more concerned with reducing power losses than with reducing heating.

Thus the cylinder is heated, mainly, by the compression and firing of the fuel mixture at the top of the stroke. The top of the cylinder is heated directly by this means whilst the lower portion receives heat indirectly through conduction of some of this heat through the cylinder walls. The final heat "envelope" is of the form shown in *Fig.* 2 with the top of the cylinder receiving by far the most amount of heating. And since metals expand on heating to a degree proportional to the temperature rise, it is fairly obvious that distortion of the cylinder can take place. Such distortion can have several effects. It can obviously affect the piston-cylinder fit at the top of the stroke, perhaps to a point where piston friction does become excessive, so resulting in loss of power—and still more heating to make matters worse. If the temperature reaches the point where the oil itself is carbonised, lubrication will break down and the piston will soon seize. Distortion can also lead to gas leakage, further affecting efficiency, and is a problem which engine designers are always up against. It is more apparent in diesels than in glow motors, largely because of the higher working pressures and "tighter" piston fits, which is the main reason why the cylinder liner or cylinder of a diesel is usually much thicker in the wall and much more robust than that of a glow motor of similar size. The faster the engine is made to run the hotter it is likely to get (due to the increased rate of "heat" cycles) and the bigger the problem. In the end the "best" engine is usually the one which experiences minimum cylinder distortion and it is significant that some engines with exceptional performance for their size—like the A.M. "10"—have exceptionally robust cylinders.

Fortunately only a relatively moderate amount of cooling is necessary to restrain the heat "envelope".

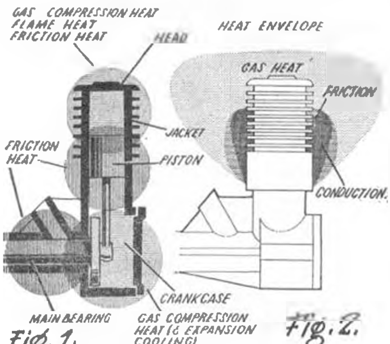


Fig. 1.   Fig. 2.

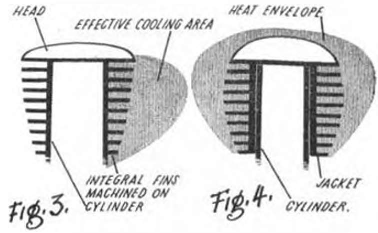


Fig. 3. Fig. 4.

The ideal arrangement is a series of very thin fins formed integral with the cylinder walls, their individual lengths corresponding approximately to the shape of the aforementioned "heat envelope"—*Fig.* 3.

American manufacturers commonly do adopt this method, machining thin fins directly on to the cylinder barrel. British and Continental engine design is more or less standardised around the use of a separate cylinder jacket screwed on to or bolting down against a hardened steel cylinder which becomes, in effect, a sleeve or liner—*Fig.* 4. It is not practicable to reproduce the jacket as a series of very fine fins. Equally it is impractical to form fine fins direct on a ***hardened*** steel cylinder as these would be extremely brittle and readily broken. There is also the point that the cylinder steels used on American engines are not readily available in this country.

This cylinder jacket is nearly always made from light alloy, to save weight. Aluminium, too, is a very good conductor of heat, so that the whole of the finned area readily heats up and dissipates engine heat to the cooling airstream. This more than offsets the inherent disadvantage that the fins cannot be made so thin, and so closely spaced, as would be possible with steel.

Nearly all aluminium alloys, however, have the characteristic of relatively high expansion with heat. If the jacket is, at first, a tight fit against the cylinder it will tend on heating up to expand away from the cylinder walls and so leave a definite air gap between—*Fig.* 5.

Air is a very poor conductor of heat and so this gap is effectively a "heat dam" or barrier preventing free transfer of heat from the cylinder to the outer jacket. Thus the cooling effect of the airstream is not readily passed back to the cylinder. The most satisfactory way to minimise this is to make the cylinder jacket a really snug fit to start with. On such a layout, too, the head may become the most effective cooling area since it receives its heat by direct conduction through the metal-to-metal contact. The problem is not necessarily as serious as would appear, and in fact, most "jacketed" cylinders are quite satisfactory from the point of view of adequate air cooling. They may, however, show signs of overheating when this cooling airflow is restricted, such as when the majority of the slipstream is blocked off.

Head cooling seldom appears to be critical. A plain, hemispherical shape generally provides adequate cooling area and where fins are used on the head these are usually chosen primarily from the point of view of appearance. On the other hand, the heads of modern high speed engines do get extremely hot and on diesels it is generally to be recommended that in a cowled-in installation there should be an adequate passage for airflow over the head. In the case of glow motors the head may deliberately be unfinned to maintain glow plug heat when in the air (*e.g.*, Dooling and Carter) with cowled-in glow engines no cooling flow over the head should be necessary.

A gasket will act as a "heat barrier" where fitted under a detachable head to act as a gas seal.—*Fig.* 6. If the actual combustion space is distant from the head, as in a diesel, this would probably make the head much cooler without affecting the running of the engine. On a glow motor where the flame plays directly on the underside of the head the gasket may play an appreciable part in determining the working temperature of the plug. With complete cooling in flight, *i.e.*, a slipstream all over the engine, the head may be too cool if gasketed. If in direct contact with the cylinder (no gasket) excessive cooling would be offset by a transfer of cylinder heat by conduction.

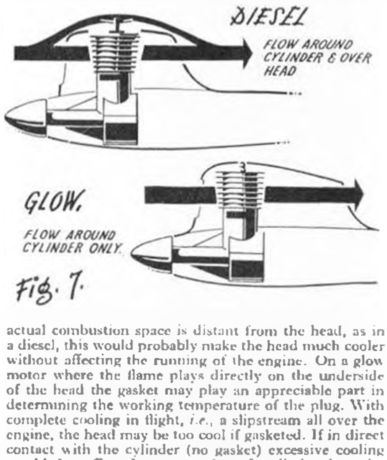


Fig. 7.

The unequal expansion rates of light alloys and steels mitigates against the use of the former material for contra-pistons, although this is quite common practice on certain Continental engines. The top portion of the cylinder is nearly the hottest point of the whole engine and so there exists in this region the largest expansion differential. As a consequence, as soon as the engine warms up, the light alloy contra-piston virtually seizes in the cylinder, providing an excellent gas seal but making it extremely difficult, or even impossible, to adjust the compression setting from that point on. It is usually possible to increase the compression with the contra-

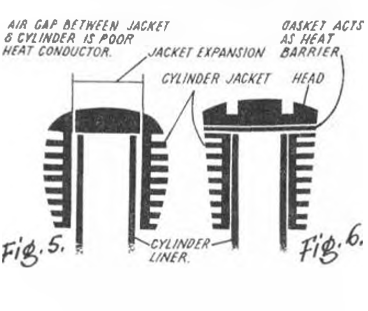


Fig. 5. Fig. 6.

Engine illustrated overleaf is the Fox 29R, holder of a new U.S.A. speed record for the 5 c.c. class at 148·09 m.p.h. Needle valve is located for convenience on the crankcase backplate.

piston seized, but it will not blow back on its own if the compression screw is backed off.

The higher rate of expansion common to light alloys also affects choice of this material for pistons, the top of the piston being the hottest part of the working engine. Where light alloy pistons are employed they are not used to provide a gas seal, so need never reach the condition of being a "seize" fit. The necessary seal is produced by fitting the piston with rings so that the piston itself need only be a relatively slack fit in the cylinder to start with. In such cases, too, it is general to use a low-expansion light alloy (a standard "fullsize" piston alloy).

A number of engines have been tried with plain aluminium pistons (and one, the American "Thor", even had an aluminium cylinder to go with it), but no such combination has worked out successfully in practice. There may, however, be possibilities here in using deep anodised aluminium as anodised light alloy surfaces have been used with considerable success for gears in the engineering world. Thus the use of a plain aluminium piston is not entirely ruled out.

The cooling effect of a propeller slipstream under static conditions is somewhat different to that in flight. In the latter case cooling should be much more effective and may even affect engine layout at high speeds—*e.g.*, the plain head on a glow motor, as mentioned previously. Where the engine is completely cowled in

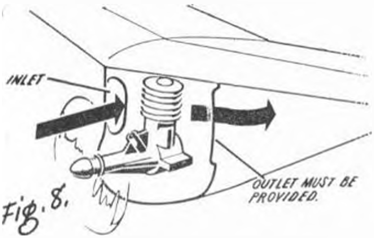


Fig. 8.

it should be satisfactory to provide a flow of air to the depth of the cylinder, and over the head in the case of a diesel, but not necessarily so with a glow motor—*Fig.* 7. The small amount of heating received by the crankcase should normally be nothing to bother about as this will be dissipated by conduction through the rest of the engine. Crankcase cooling can, however, be important on an engine where the bearing is not too good. Often an engine with a main bearing a little on the tight side, or with tight spots, will run much better in the air than "static" because the bearing is receiving continuous cooling in the former case but not in the latter.

The out-in-the-open engine will always receive adequate cooling in flight. The completely cowled-in engine will receive adequate cooling provided there is a good air entry and *exit* to the cooling. A failing on some free flight installations is to provide an air entry into the cowling space and the engine may overheat, although this is unlikely on a short run. The main objection is the high drag of such an installation.

Most engines will run satisfactorily at quite high speeds for limited periods without any cooling at all, other than radiation of heat to the lower ambient temperature of the surrounding air. On the AERO-

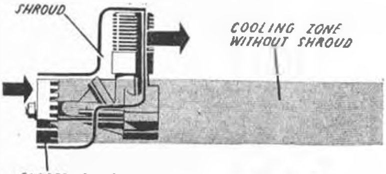


Fig. 9.

MODELLER dynamometer tests, for example, where the engine is driving a rotor with no generated air blast or slipstream, cooling is provided by a separate centrifugal blower mounted by the engine and blowing a constant stream of air over the engine. Without this, the cylinder of the engine on test will quickly "fry".

Fan blades incorporated on a flywheel are not a suitable means of providing a cooling airstream for static running unless the engine is properly shrouded so that the airstream is directed up and past the cylinder—*Fig.* 9. Otherwise what slipstream was generated by the flywheel periphery would be directed only along the bearing and crankcase. Any type of "blower" driven directly by the engine will, of course, absorb power, which means that unless useful power can be extracted from the engine crankshaft.

Water cooling does not suffer from this limitation and is the logical choice for prolonged static running with no fan-type loads, or for marine installations. Most air-cooled engines are readily converted to water cooling by replacing the cylinder jacket with a hollow jacket (usually of brass) through which water can be circulated. Circulation can be achieved by thermo-syphon action provided the pipes are of generous diameter (usually at least ¼ in. bore is required for satisfactory circulation), the main reservoir or water holder also acting as a cooling tank and thus constantly feeding the cylinder jacket with cooled water—*Fig.* 10.

The thermo-syphon is particularly adaptable to static running, but marine units usually draw in a supply of water by means of a scoop under the hull and discharge it overboard again after circulation through the jacket. Thus the engine is fed with a constant stream of cool, fresh water without any mechanical pump being involved. *Next month: Silencers.*

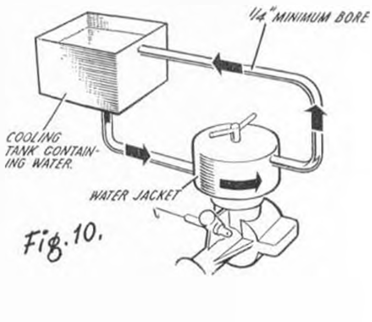


Fig. 10.

Model News

THE DYNAJET-POWERED Shooting Star on this page had been hanging around the attic in John Claydon's house for more than three years awaiting a few minor titivations.

Early last Autumn the model was finally completed and taken off to an abandoned airfield in Essex to see how it would fly. In photo **1** Brian Dunn and John Claydon are seen posed behind their handiwork. Soon the 8-lb. model was airborne after a total of only ½-lap (**2**) and estimated airspeed was around 85 m.p.h., but it was noted that after six or seven laps a flicker of flame appeared around the rear fuselage and the model was promptly dumped in a crash landing and the pit crew hastily extinguished a minor conflagration **3**. Not daunted, the flyers put the Shooting Star up once more for another flight and again on the sixth lap flames appeared around the fuselage and the Star was brought back to earth hurriedly. This time matters were beyond control and although there was just time to undo the Dynajet mounting straps, the airframe could not be saved, for the fire was actually raging between the asbestos lining inside the fuselage and the outer planking. So the once beautiful model had to burn itself out, **4**, but the owners did not appear to be at all disappointed at their loss as will be seen in picture **5**.

Although not a stunt model, the scale Ju.87D in photo **6** is flap and elevator controlled and flies on 40-ft. lines at a speed between 50 and 60 m.p.h. It was built by Vincent McKenna of the Glasgow Gremlins Club and fitted with a 2·46 Racer diesel. He thinks that with a bigger motor he will overcome the "Christmas Tree" drag of the cockpit, radiator and wheel spats and the Stuka would be capable of aerobatics.

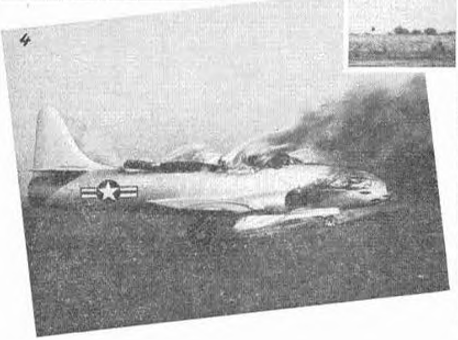
Dick Taylor, son of the well-known Major S. D. Taylor of S.M.A.E. fame, made the pusher projectile in picture **7** and attained the amazing speed of 45·1 m.p.h. which has been the subject of a new S.M.A.E. speed record claim. Known as P.D.Q., it is 30 in. long

1

3

2

4



5

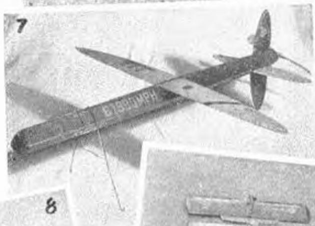
with a span of 24 in. and has two ounces of ¼-in. rubber driving an 8-in. prop. Power run is a few brief seconds and just enough for the required speed measuring distance. We shall be publishing more on this interesting r.t.p. model, including scale plans, in our February issue.

Through club reports we learned during the course of the year that quite by coincidence a number of enthusiasts throughout the country had discovered that the *Creep* F.A.I. power design for 2·5 c.c. formed an admirable basis for a half-size model, seen in picture **8**. Built by J. J. Miller of Newcastle-upon-Tyne, this is powered by an Allbon Dart and weighs only 3½ oz. for its 117 sq. inch wing. Span is 27 in. and the average duration of 2 min. 38sec. is claimed from a 15-second engine run. They must have calm weather in Newcastle!

G. Oswell, also from Newcastle, is leaving the Old Country for New Zealand in 1957; but before he goes he has sent along photo **9** to illustrate his approach to Combat flying-wing design, based on an article in the 1955 *Aeromodeller Annual*. A series of these have been built in his club (Tynemouth M.A.C.) and they are 32-in. span by 8-in. chord, weighing approximately 9 ounces with a beam mounted Elfin 2·49. Airspeed is in the region of 75 m.p.h.

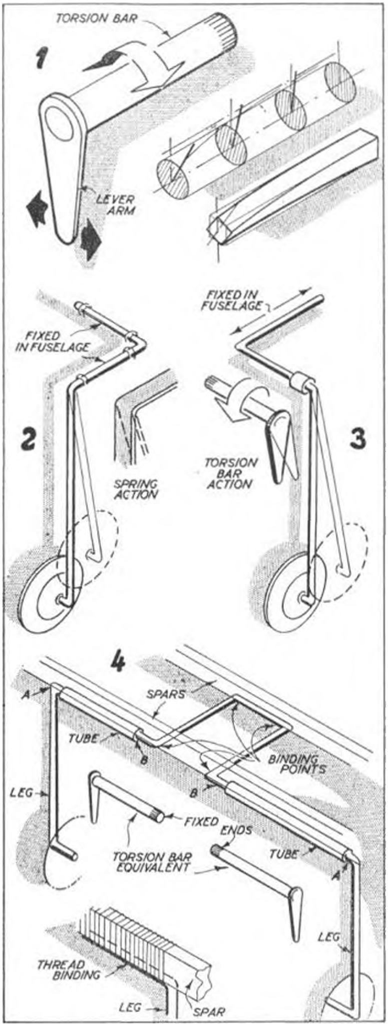
We knew the next photo had to arrive sooner or later and it represents the first scale Auster Agricola submitted for this feature. Built by A. W. Evans of Bromley, it is 47-in. span, weighs 27 oz. and is powered by a Frog 150. Initial flight tests show a strong tendency of consecutive loops, but we are sure that Mr. Evans will soon cure this minor fault and be flying the Angular Agricultural Aeroplane at the 1957 Nationals.

Finally, an encourager for the youngsters in photo **11** where we see thirteen-year-old Peter Richardson of Blackpool who was awarded the Junior Challenge Trophy in the *Stockport Express* Glider Contest at Woodford last year. Already Peter has a collection of cups and certificates, and we understand that we shall be hearing more of his activities in the future.



Aeromodelling Step-by-Step

TORSION BAR UNDERCARRIAGES



MANY PEOPLE FIND it difficult to appreciate the action of a torsion bar—possibly because of its technical name—but it is a very simple, and extremely effective, piece of mechanism. It consists of nothing more than a rod or bar of tough, fairly springy metal, like steel, fixed at one end and with the other end free. If a twisting load is applied to the free end of the bar—*e.g.*, by a "push" or "pull" force on the end of a lever arm attached to the free end of the bar (**1**)—this load will be resisted smoothly and progressively and when the load is removed the lever arm will return to its original position. Any shape of section will exhibit this spring-like resistance to twisting. In a circular bar the twist will take place without any apparent change in section, but a square or rectangular bar will distort externally. Hence a circular section is normally employed for simple torque bars since such a bar can work in a close fitting housing without jamming.

Once the action of a torque bar is appreciated, it is easy to see how simple torque bars can be bent from spring wire. That is, the wire is so bent and *fastened* that a certain section is acting as a torsion bar, rather than the more usual method of relying on the cantilever action of a length of wire for springing.

This basic difference is shown in (**2**) representing a typical monoleg undercarriage, fastened to a fuselage and (**3**) a virtually identical unit, but mounted to give torsion bar springing. With the orthodox method of mounting (**2**) the wire leg has a simple "knee" springing action, plus a certain amount of flexibility in the leg itself. In (**3**) the leg is initially fastened to the fuselage by means of a bushing or similar device and taken across the fuselage before being rigidly anchored to the structure. Thus the entry end of the wire becomes the free end of a torsion bar, the effective torsion bar length being that length of wire across the fuselage to the point where it is first fastened down. The resulting spring action is far smoother than with the other type of springing. The main trouble is in anchoring the first fitting firmly to the structure so that the "free" end of the torsion bar length is properly restrained, but it still free to twist or rotate in this fitting. Actually a thread binding will usually do the job, well coated with cement. The wire will readily break free without damaging the binding, which then acts like a normal bushing. It is, however, subject to wear by the twisting of the wire passing through it.

An adaptation of this type of undercarriage mounting to a typical scale undercarriage for control line models is shown in (**4**). Here, effectively, two torsion bar units are involved, one for each leg, although the whole undercarriage may be bent from a single piece of wire. Usual attachment points are the wing spars, although the actual fixed part of the undercarriage wire may be accommodated in the fuselage.

Each leg, as bent, is thus the lever arm for its respective torsion bar—the wire length AB. "A" is the free end of the torsion bar and "B" the fixed end and to ensure proper freedom of the torsion bars along their length, the section "AB" should run through tubing. This tubing is then bound to the wing spars (or other suitable structural members) to locate the undercarriage securely. The ends "A" are the most likely to break loose.

The fixed ends "B" of each torsion bar length are bound to the airframe structure, together with the U-shaped central portion of wire. This then results in a very strong, rigid assembly with the legs effectively sprung. The effective springing and the load on the undercarriage wire is far less than if each leg were rigidly mounted to the structure at point "A".

In practice, the same remarks as before about thread binding along the wire length "A B" apply. The torsion bar action will probably be retained once the wire breaks loose from the retaining binding by twisting along its length. It is better, however, to make a definite pivot anchorage, at least at the ends "A".

When a torsion bar leg is splayed outwards (**5**) the torsion bar action is effective only as regards true backward deflection. Any outward deflection is resisted by the normal cantilever spring action of a fixed length of wire. Theoretically, at least, a torsion spring could be wound at the top of the leg to take care of outward deflection (this spring loop acting as a torsion spring) as shown in the enlarged sketch. This would not normally be considered a practical answer, however, nor should it be necessary. If the wire diameter used is prone to splay outwards, then a simple spreader between the two legs would be a far better solution.

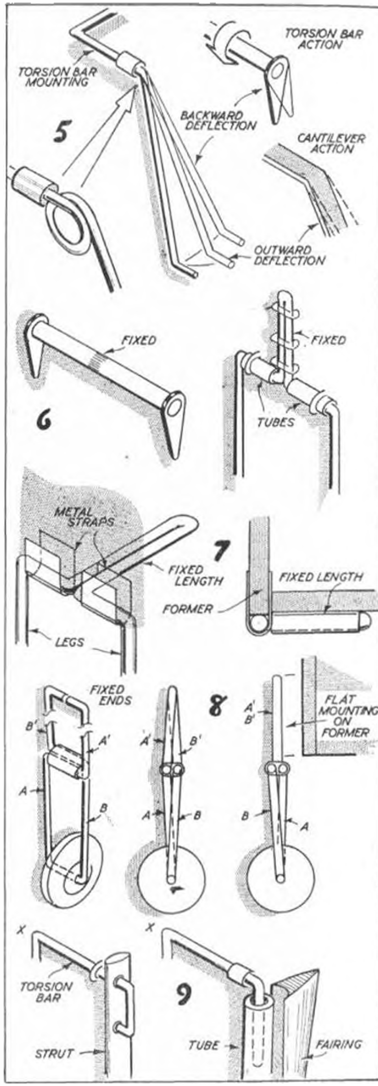
There is no reason why a torsion bar cannot be "worked" from both ends, *i.e.*, with the centre of the bar fixed, except for certain practical difficulties in anchoring the middle section of the bar. Thus the double torsion bar sketched in (**6**) can be translated in terms of a practical nosewheel leg, as in the right-hand sketch. The middle section of the bar can readily be anchored, but the outer ends of the tubes may not be so easy to secure against vertical shocks as received in normal landing loads.

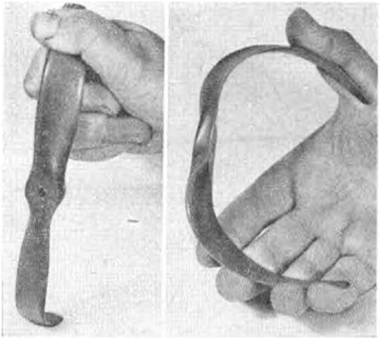
An alternative method is suggested in (**7**). Here the torsion bar lengths of the undercarriage are pivoted in close fitting metal straps carried round the legs and securely fastened to the front former. The undercarriage is thus mounted on the bottom edge of the former. The fixed length of wire is then carried back and anchored along its length to a suitable strong member running back from the front former.

A further variation is shown in (**8**). Here the whole undercarriage is bent as a vertical unit, leg "A" crossing leg "B" so that in side view the respective "fixed" ends are staggered one wire diameter apart. The horizontal sections of each leg are the effective torsion bar lengths and these are pivoted by wrapping around with a metal sleeve, well soldered.

Provided this sleeved section is mounted underneath the former, the two fixed end lengths "A" and "B" can be attached flat to the face of the former. Thus the torsion bar length is slightly askew to the fuselage, which alignment can be corrected at the axle end by raking the two legs to compensate. This particular design has the advantage that any length can be allowed for the fixed ends to get a really secure anchorage and mounting these to a ply former follows conventional practice, *e.g.*, thread binding, metal strapping or using "J" bolts. It is also possible to raise the height of the torsion bar section above the bottom line of the fuselage by using a false former attached to the main former, but finishing at the torsion bar height required, *i.e.*, forming a "step" to clear the torsion bar sleeving. It must be remembered, however, that clearance must then be provided for backward movement of the legs.

Some further possibilities are sketched in (**9**), where a length of wire is used as the torsion bar—"X" being the fixed end in each case. The deflection of the torsion bar is inversely proportional to the fourth power of the wire diameter—thus doubling the wire diameter makes it sixteen times stiffer in the torsional sense. Thus to double the "spring" stiffness, only a relatively small increase in torsion bar diameter is required, *e.g.*, possibly the next gauge number up.





In terms of basic theory the torque absorbed by any particular propeller should be proportional to (r.p.m.)², so that the performance of any particular propeller should be capable of being expressed in the form.

$$\text{Torque } (Q) = K\,N^2$$

where K is a constant (torque coefficient)
N = r.p.m.

To be strictly true torque absorbed will also vary with the density of air and so a more accurate equation is

$$Q = Cq\sigma\,N^2$$

where Cq is the torque coefficient of the propeller, and σ is the relative air density.

Now unfortunately Cq is very dependent on the geometry of the propeller. Nominally identical propellers may have quite different values of Cq depending on differences in edge form and thickness, actual blade section, and so on, so there is one possible source of error. The fact that the relative air density may be several per cent. different on two different occasions for testing is another.

Propeller—R.P.M. figures

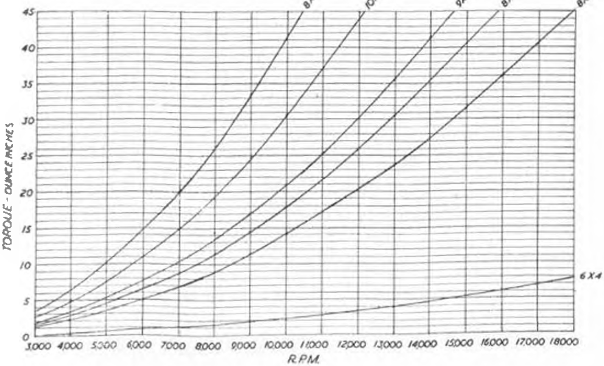
DATA ON TORQUE ABSORPTION FOR THE FROG PLASTIC RANGE

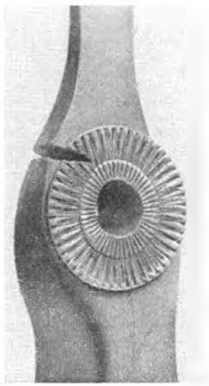
A LIMITATION, COMMON to all engine performance test reports to date, is a lack of co-relation between performance in terms of torque output and B.H.P. and performance in terms of r.p.m., with a given size of propeller. Some reports give torque and B.H.P. and no propeller-r.p.m. figures. Others give propeller-r.p.m. figures and no torque or B.H.P. measurements. Our own policy throughout has been to give both, but as a general rule derived under somewhat different test conditions. For that reason, and others which will be discussed, anomalies can appear. Engine "A" which, from the B.H.P. curve is seen to be more powerful than engine "B" does not give a correspondingly higher r.p.m. figure on a quoted size of propeller.

Other possible sources of error are largely concerned with measurement and adjustment—limits of accuracy of the measuring instrument used and in adjusting the engine itself to optimum settings on a particular load.

Dealing with direct measurement first. Liability to error in r.p.m. measurement can be as high as *plus or minus* 10 per cent. with a good reed tachometer and up to twice this with a poor one. That could mean a matter of 1,500 to 3,000 r.p.m. at a nominal 15,000 r.p.m. In general, errors will be smaller than this but, in any case, reed-type counters are not used for our own figures. But either of the

Heading demonstrates flexibility of the early Acetate type Frog 10 x 6 at left, and same size "Perm-a-Prop" by Windsor Eng: U.S.A. at right. Latter is a remarkably efficient prop in tinted Nylon base plastic. Below: the FROG prop torque curves, and at right, the hazard of an Acetate moulding with blade root failure





alternative standard types—a tachometer or a stroboscope—are still subject to limitations. The former absorbs a certain amount of power to drive and therefore gives a slightly low reading. The latter is subject to drift, possibly as much as 500 r.p.m. *either side* of a nominal value at times over a relatively short period.

Add to this the fact that engine adjustment also plays a significant part. Also, of course, many engines tend to lose speed on warming up and show a consistent r.p.m. figure lower than might be obtained by measuring straight away after starting.

Try running the same engine with the same propeller on a really rigid mount and then on a fairly flexible mount and again you may get a wide difference in the two r.p.m. readings.

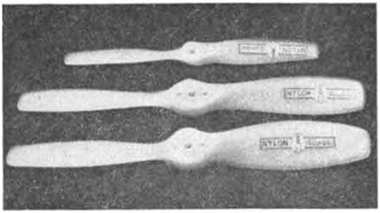
Sooner or later, even taking care to reduce reading and adjustment errors to a minimum, all the "plus" or "minus" errors are going to add up the same way and then you get a big discrepancy, which may well pass unnoticed at the time. Since by far the most difficult part of engine testing is in extracting torque figures corresponding to different speeds, *i.e.*, at different braking loads, one is rather apt to regard the more direct measurement of how fast an engine will drive a particular prop., as more of an afterthought. So at the conclusion of the main test the engine is taken off the dynamometer and clamped on another rig for propeller—r.p.m. figures.

To the engine user, however, the propeller data is probably of more use than B.H.P. or torque curves and so for a long time it has been appreciated that a reliable tie-up between the two was necessary. By conforming strictly to the use of a selected batch of propellers only and averaging out results over a large number of engine tests it has, finally, been possible to produce a series of curves which show good co-relation with practical results. The possibility of error is still there, of course, and seldom do measured propeller r.p.m. figures obtained on the test show precise agreement with the calculated figures, but the agreement now seems close enough to warrant publication of the curves. It should be emphasised, of course, that these curves related to a particular individual set of propellers and others of nominally the same size and type may give slightly different results. Curves for a set of standard Frog plastic propellers are the subject of the graph, calculated under conditions appropriate to the present standard torque measurement set-up.

Frog Prop Curves

These curves plot torque absorbed by each propeller against r.p.m. and are based on the simplified equation of torque = torque coefficient *times* $(\text{r.p.m.})^2$ and assumes that air density is constant. The use of *torque* absorbed instead of *power* absorbed is preferred because torque is the *measured* figure on test. The corresponding horse-power absorbed is found by

$$\text{horse power} = \frac{\text{torque (oz.-in.)} \times \text{r.p.m.}}{1{,}008{,}000}$$



6 x 4, 8 x 5 and 9 x 6 Frog Nylon props are translucent

or with sufficient accuracy for most purposes

H.P. = torque (oz.-in.) x r.p.m. *divided by* 1,000,000

Thus thinking in terms of power, original errors are *multiplied* by r.p.m. and so exaggerated.

The Frog range of plastic propellers is actually moulded in high impact Polystyrene, Acetate and Nylon AF, the former in colours (mainly red) and the latter only in natural (translucent creamy-white). These materials are thermoplastic which means that the pitch angles of the blades can be changed by softening the plastic with gentle heat and twisting. This is an advantage in many practical cases. For example, the standard propeller for the Frog "50" is the 6 x 4 which is a little too small for optimum performance on a control line model. A marked improvement can generally be realised by resetting the blades to a slightly coarser pitch angle (5 to 6 inches pitch) and, if necessary, trimming the blade diameter slightly. Such treatment provides an "intermediate" propeller size to fill the gap at present existing between the 6 x 4 and the next smallest size in the range (8 x 5).

The fact that the materials used are thermoplastic is also a disadvantage in that the pitch as moulded may be subjected to change on ageing. In fact the final pitch on any moulded propeller is largely dependent on the temperature of the product when initially removed from the mould. Thus individual examples do show differences in performance in practice, the main offender in the range being the 8 x 5 which has a somewhat thick blade section. In extreme cases it is possible to find an 8 x 5 propeller giving almost identical performance to an 8 x 6, the change nearly always being an increase in effective pitch (and thus an increase in power absorbed in driving). Such changes, too, are rather more marked with the acetate series, than when moulded in nylon.

In the main, however, consistency is quite good and the curves have been extracted for a representative number of typical samples of the moulded nylon series. As an example of the toughness of nylon propellers, it might be mentioned that in our standard engine tests, even 2.5 and 3.5 c.c. engines are commonly run on the 6 x 4 nylon propeller when the r.p.m. figure achieved may well go beyond the 20,000 mark and even with the hub bored out to take the large sizes of propeller shafts, no failure of a propeller has yet been experienced.

RADIO CONTROL NOTES

Howard Boys describes his experiment with Delayed Relay Circuits and range checks on various Transmitters

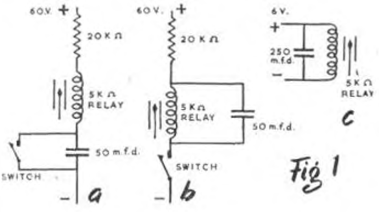
Bertil Beckman of Sweden provides an appropriate winter setting with his R/C Trainer which uses an E.D. 2.46 c.c. motor and E.D. 3 Reed radio equipment

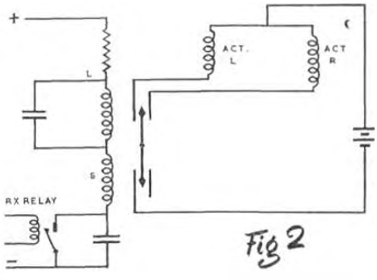
MR. HERBERT OF Blackburn has been enquiring about delayed relays, and wanted some figures for working out the time of delay. There is a formula for working this out from the resistance and capacity, but a relay also has inductance, and the writer was unable to find out exactly how to bring this into the working, and in any case the inductance would vary. The only thing to do was to carry out some tests. Different circuits were tried, of the type normally used with a relay in a reed circuit, though using larger condensers to give a measurable time of delay. These are shown in *Fig.* 1. The principle used is that of the time taken for a condenser to charge and discharge through a resistance.

A Typhoon relay was used since this has been found to be the best of its type the writer has tried, and it was set to close at 0·8 ma. and open at 0·6 ma. A small 60-volt battery that was handy was used for *Fig.* 1*a* and 1*b* and this gave a current of 2·1 ma. through the relay, with the switch closed. In 1*a* the relay closed as soon as the switch was closed, as near as could be judged, and when the switch was opened there was a delay of about five seconds before the relay opened. This was rather more than expected. In 1*b* conditions were a bit different. When the switch was closed it took about half a second for the relay to close, and when the switch was opened it took about another half second for the relay to open. Another test was made using a 10 K ohm resistor and a 22½-volt battery, giving a current of 1·2 ma. through the relay. This gave much the same results and increasing the condenser to 75 mfd. gave a proportionately longer delay in opening and closing. *Fig.* 1*c* gave immediate closing of the relay with a delayed opening of about 2½ seconds. It should be noted that the voltage rating of the condensers should suit the applied voltage. Strictly speaking, a lower rating could be used in 1*b*, but the condenser would be destroyed if the relay should be open circuited. The actual rating used for the tests was 50 for the 50 mfd., this weighing no more than about half an ounce. For the 250 mfd. a 12-volt bias condenser was used, which weighed more like 1½ ounces. These weights are only approximate and the timing was not 100 per cent. accurate, there being no proper timing apparatus available, but it does give a reasonable idea of the sort of delay to be expected. The delay could be altered by adjusting the relay to close at a current value nearer the maximum and open nearer the minimum. Mr. Herbert wanted a relay with delayed closing so that if contact was made only briefly, the relay would not close, which means using circuit 1*b*.

It is possible to combine two relays in the one circuit as shown in *Fig.* 2. *S* will remain closed with short pulses, but *L* will not close. With long pulses, both relays will remain closed. If actuators for left and right are wired up as shown, then with short pulses actuator *R* will be energised, and with long pulses actuator *L* will be energised. With no pulse, neither actuator will be energised. Values of resistors and condensers would depend on the pulse speed and would need to be found by trial, but a start could be made with 20 K ohms and 10 mfd. with 40 or 50 volts.

There has only been limited activity on the transmitter tests, mentioned in the September, 1956, issue, due partly to the weather, partly the intervention of a contest, and partly to another mysterious trouble. However, a short range receiver was used, and with the transmitter circuit of *Fig.* 3, a range of 300 yards was obtained, the input power being 5 watts. The transmitter was the normal type standing on the ground.





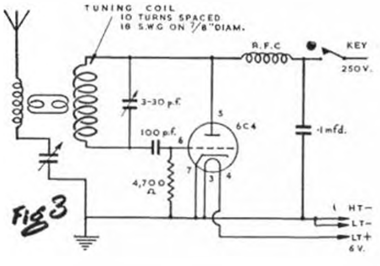


Fig 3

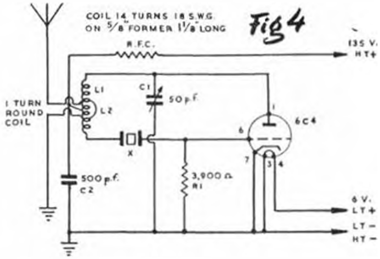


Fig 4

The next transmitter was the crystal controlled overtone type shown in *Fig.* 4, using the model box aerial mount shown in the photograph on page 492 of the September AEROMODELLER. The input power to this was 1·7 watts and the range 70 yards. The McQue transmitter housed in the same box gave a range of 100 yards, the total power input for the two valves being 1·75 watts. In this same box aerial mount, an AEROMODELLER transmitter circuit as shown in *Fig.* 5, gave a range of 140 yards. The input power being 2·7 watts. We are mostly interested in the range obtained for a given input power, so that using the same aerial system gives a fair comparison. To avoid another possible source of error, the same crystal was used for both the crystal controlled transmitters, the two circuits fortunately being suitable for this. The overtone type does not show up very well, but the others give a range roughly depending on the power input. More has yet to be done, particularly regarding comparisons with the ex-government crystals, and the new types used so far. Perhaps it should be pointed out that all the transmitters mentioned, have given a range of something like half a mile with the usual XFG 1 or hard valve receivers. (The McQue Tx appeared March, 1956.)

Dead Spot!

A mysterious trouble the writer has experienced this year, is loss of control shortly after take-off. The last time it proved inconvenient, was at the I.R.C.M.S. contest in which it prevented the model from flying the course to the left. The model is set to circle to the left without signal and therefore will not take-off if the radio is not working properly. In this case, the mode took off and began flying upwind towards the first pylon, but before getting there it turned left, and did something like a full circle before coming under control again. It then behaved quite well. A check on tuning and operation was made on the ground at the upwind pylon, but on the second flight the model did the same thing again, though it was sent round the course in the opposite direction and was well under control at much greater distances and heights. It was later remembered that this peculiar left turn just after take-off had occurred at the AEROMODELLER Trophy contest at Cranfield, and a similar sort of "dead" spot has sometimes been noticed on the home aerodrome. The trouble had not been noticed at Hemswell, when it was remembered that a different receiver had been in use, and it had not been noticed at home when a different transmitter was used. Some investigations are being made into this because here we have a transmitter and receiver, which operate perfectly on the ground up to at least half a mile, and operates perfectly in the air at much greater ranges than are normally required, yet about 70 to 100 yards upwind and 15 or 20 feet high, there is no response. The actual extent of this dead spot is not yet known, but experiments are in hand to find it. The model has been flown into this dead spot with the one transmitter, and then the control taken over by another transmitter. It is a bit nerve-wracking though, as when the model gets out of the dead spot it is shown by a spiral dive to the right, and when this starts at a height of 15 or 20 feet, and you have two transmitters to put over to left turn, you wonder if you will be in time!

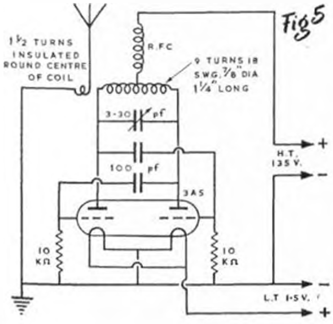


Fig 5

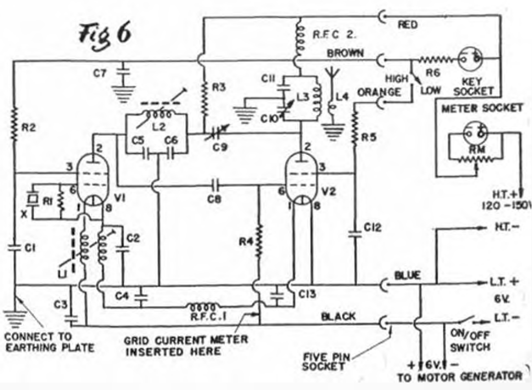


Fig 6

CLUB NEWS

PETROL RATIONING until April at least has come at a time when it will have a minimum effect on the model movement in Great Britain: but it has nevertheless obliged the Heanor Club to cancel their C/L rally on January 6th. It is unfortunate that we have to travel to out-of-the-way places for model flying, and I hope that most of you will be able to manage with the few gallons per month that the coupons allow. One thankful item is that there is no immediate sign of the ration affecting model fuel supplies.

London

Apologies to **SIDCUP A.S.** for mentioning team racing with announcement of their rally date which was for combat and stunt only. They had fine weather and a good attendance. Eddie Cosh and Henry Nicholls judged Dave Platt as winner in stunt, only to be told he was disqualified as apparently he used a borrowed model. Shame! Methinks I know the model well, and it really is a beauty. Insufficient light created a difficulty for the combat finalists who were five in number, so the results were drawn from a hat. Mike Pinnock of **ENFIELD AND D.M.A.C.** was the lucky winner. Sidcup had a fine season in 1956 with four 1sts in major contest, seven 2nds, seven 3rds and eleven 4ths plus the 1.5 c.c. speed record in the bag. Back to Enfield and we find the name of Pinnock again in top combat place for the club event. Jim Mosely won the Bambridge f/f trophy with his sailplane in an exciting fly-off.

At 7.30 every Tuesday at 189 Everton Drive, Stanmore, is the meeting place for **QUEENSBURY AND D.M.A.C.**, now sixteen strong and keen to enter the new season's contests. In the same quarter, at **NORTHWOOD**, a regular meeting is held every other Friday at the local Darby and Joan Club. 14 of the 30 members recently entered the club glider event, won by Mr. Ogilvie. Yet another new name for this column, and a most welcome one, too, is the **DEBDENAIRS** at Loughton in Essex, where there had always been great interest in flying. Fortnightly meetings take place at 8 o'clock in Loughton Hall, Rectory Lane, and Grange Farm Centre is available to members for week-end flying. *See* overleaf for Secretarial addresses of these clubs.

WEST ESSEX opened the winter programme with two film shows, one lasting over three hours with three projectors operated by Ken Marsh, Sid Sutherland and Fred Carter. Fred demonstrated his sound equipment at the October 24th meeting. Second Wednesday each month is clubnight at Markhouse Road School, so if you're in the area—call in.

READING AND D.M.A.C. has grown to 35 members, and plenty of lolly in the kitty, while indoor R.T.P. and rubber team race meetings are planned this winter. In a recent inter-club affair with **FARNBOROUGH** the latter club won with top three individual places to their credit, headed by Maurice Gates and his *Inch Worm*. Speaking of inter-club meetings, **HAYES M.A.C.** are jubilant that they should win the L.D.I.C.C.C. from **ST. ALBANS** by 28 : 45 to 20 : 58. The new high tension wires at Chobham claimed their first victim when John Thompson's power model was cleaved in twain. Sunday C/L flying takes place in Cranfield Park, and an open challenge is extended for a combat match—any takers?

South Eastern

Fred Boxall collected the Arthur Mullett Rose Bowl from brother Reg by a scant 7 secs. margin in the **BRIGHTON D.M.A.C.** open comp.; but Reg got his own back by winning the Lanes cup for precision a week later. A local pond permits hydro flying, no matter what the wind direction, so we shall be hearing of float events in future. Nearby **SOUTHERN CROSS A.C.** found J. West atop of the 1956 club champ., and I see by their programme that they are planning a Christmas party. It's surprising how few of our clubs have this feature.

Southern

SOLENT HEIGHTS M.F.C. on the Isle of Wight have been enjoying a film show among their winter indoor meets, and more indoor flying is on the programme for **SOUTHAMPTON M.A.C.** At the Stoney Cross site, P. Giggle and Miss M. Pepper were 1st and 2nd in Rubber at the Area Rally, and N. Worley and R. O'Rourke 2nd and 3rd in power. A new club has been formed at **CHESSINGTON** now that the 1034 Sqdn. A.T.C. is taking members from outside the Air Training Corps. Brian Laurence came 1st and 2nd in the Surrey Wing A.T.C. Championships, advanced design class. At **DORKING** combat is in the foreground and there's a flush of ETA powered *Mercury Thunderbirds* ready for team racing. Contact F. Tuck at 11 Park Way, Dorking, if you are in the district.

South Midland

OXFORD METEORS will have the limelight when Ian Smith's 8-ft. span scale Beverly Transport takes the air under the power of four A.M. 25's. Just imagine that fuselage volume ! ! !

Midland

Star of **BIRMINGHAM M.A.C.** is Reg Lennox who has placed in *every* open rubber event entered. Indoor season is in full swing with Messrs. Monks, Read and Poole exceeding 51 min. in a small hall. At **LEICESTER** there's also indoor activity at Catharine Street School every Tuesday except Christmas Day, and this is one clubroom where tea and biscuits are laid on for the hungry. Remember that one-winged combat model in last month's Model News? It was Mike Kendrick's of **WEST BROMWICH** and I learn that the other wing half was resoundingly removed by the back of a pit crewman's head! Tough luck, tuffnut! Design was the *Ghost*, a Grimmet creation, very popular in those parts.

East Anglian

Members of **CAMBRIDGE M.A.C.** have been asked to contribute old plans and books to a Club Library, whence the same items will be hired out at a few pence per week. Sounds like a good steady fund raiser.

At **CLACTON** the club has 36 members and use of a site on Jaywick Marshes for freeflight and the local recreation ground for C/L; building facilities are available at the Clacton County Youth Centre. Farther up the coast at **IPSWICH** combat is being flown in two classes, up to 2 c.c. and 2-5 c.c. for even matching among the clubsters. Jetex R.T.P. speed has rendered life dangerous in the clubroom, especially when the Jetmasters get fizzing!

South Western

Final rally of the season of the **S.W. R/C M.F.S.** was held on November 11th at Crownhill Downs, near Plymouth. It was "fly-for-fun" day, with no official contests. Best performances were by Harry Stilling's "*Zoom*" in fast stunts near the ground (once clearing the deck by 3 feet at the bottom of a screaming loop) and Roy Dunstan's own-design E.D. 246 powered model. Hilton O'Heffernan's R6B was troubled with uneven motor-runs, but performed well otherwise. Annual subs are 10s. for flying members and 5s. for associates. All R/C enthusiasts in Cornwall, Devon, Somerset and Dorset are eligible, full details from the Hon. Sec., H. Stillings, 6 Alpha Street, Exeter.

Western

Despite the weather, **CHELTENHAM M.A.C.** has had its best season to date if contest wins are a criterion, these including B. H. Wager's Area Glider Trophy and Spike Champion's Weston Cup for area t/r champ. At the local Hobbies Exhibition in September the club flew over 7 miles with 3s. 9d. scale kits flown r.t.p., consuming 36 yards of rubber in the process. Combat flying with these models is exciting we are told, and damage mainly confined to tissue!

BRISTOL AND WEST M.A.C. congratulates member Bryant Jones on his seventh place in the 1956 Glider Championships. Interest in Wakefield models is increasing, though the best are still falling short of a 4-min.-in-still-air performance. Experimental types Farr and son have developed a revolutionary A/2 which they insist is capable of a sinking speed of less than one foot per second. Other members remain cynical.

BRISTOL ACES are keen on R.T.P. scale and it is hoped that a triangular event will be run between the three Bristol clubs. **SWINDON M.A.C.** concluded the 1956 season with slope soaring on the Wiltshire downs, won by P. Wickham. Club championship is still a tussle between Tony Rogers and R. Parsons.

East Midland

LONG EATON D.M.A.C. at Nottingham gave six flying displays at fetes and carnivals and have now organised a winter programme of R.T.P. and film shows. New members will be welcomed any Friday night at the Youth House, Derby Road.

North Eastern

Teeside and District Gala on October 14th had fine weather, winners being T. M. Unsworth, **STOCKTON M.A.C.**, power, 12 : 28; R. Swinden, **DARLINGTON M.A.C.**, glider (*Pelican*), 8 : 32; T. B. Chambers, **STOCKTON M.A.C.**, rubber, 9 : 00; W. Watson, **THORNABY PATH-FINDERS**, Team Race; J. Stoker, **TYNEMOUTH M.A.C.**, combat. Searching for a model at Rufforth, four Darlingtonians were chased by 40 bulls (that's a lot of

THE NATIONAL GUILD OF AEROMODELLERS

Statement

In the middle of the year 1953 we sent to a number of persons who were anxious to obtain third party cover under the insurance scheme operated by the National Guild of Aeromodellers letters recommending another Insurance Scheme instead.

It has been brought to our notice that these letters could have been read as meaning that the N.G.A. scheme was not satisfactory and that persons insuring under it would not be fully or adequately covered against third party risks.

We desire to express to N.G.A. Ltd. and to its director immediately concerned, Mr. D. A. Russell, our very sincere regret that we should unwittingly have sent out letters which could have been so interpreted and we take this opportunity to state that there is no foundation or justification whatever for the adverse reflections to which we have referred. We should also like to record our sincere regret that the Society of Model Aeronautical Engineers Ltd., a society of the highest repute, has been involved in these proceedings.

bull !!) and three jumped a deep stream to escape. "Spaceman", the fourth member, was later seen washing his trousers in a nearby pond, and it was cold, too!

Hon. President of the **NOVOCASTRIA M.A.C.**, Sqdn.-Ldr. James Rush, has presented a trophy for open competition which may go to the champion of an annual rally on the famous Town Moor. Team racing is gaining a great hold and one has to queue for a turn at the practice ground. Two lady members are actively partaking in the flying and at the Darlington meeting Tony Kay came second in Class A.

North Western

The fourth annual **HYDE** Rally went with a swing, in the right direction (whose!), with results as follows:

Power	A. Collinson	Bradford	9:00
	C. A. Petty	Walsall	8:12
Rubber	C. Day	Sheffield	7:25
	G. Tideswell	C/Member	6:17
Glider	I. Fletcher	Chorlton	6:14
	N. Hutchinson	Thorne	6:13

Radio Control: C. Parkinson, Kendall, 186 points.
Team Race "A":—F. Vaughan, Chesterfield Skyliners.

Peter Foulkes who has worked hard for the success of the area organised events is soon to be wed, and the area is to recognise his services by presenting him with a token of their esteem, on the great occasion. Best wishes, Peter! The Area Championships for Rubber, Glider and Overall (could be a novelty event!) go to John O'Donnell, whose **WHITEFIELD** club takes the Rootes Trophy. John is also reigning S.M.A.E. Senior Champ. I gather that the above-mentioned "do" at Hyde was organised by one man who left it to the flyers to run the events. Only one timer for all of free-flight they tell me at Whitefield—surely a classic case where the modellers *could* have got together and found volunteer helpers: but didn't. D. W. Jackson of **ASHTON** is the Area Power Champ; I see he topped the Area results for the Halfax Trophy with 14:00, but do not have the national results to hand. Knock, knock! As mentioned in my intro, **HEANOR D.M.A.C.** have cancelled their January 6th control-line rally due to the petrol rationing. I hope this will be the only meeting affected by the restrictions this season.

At **TIMPERLY** they had a novel engine starting contest, where the entrants had to assemble and start a diesel, then run it for 30 sec. Fastest was a junior member, R. Shaw, who rearranged his Mills 75 and ran it in 1:28, followed by another junior, C. Eades, at 1:29 with an E.D. Baby. Top senior was M. Rothwell at 1:30 with another faithful Mills 75. Indoor R.T.P., an extensive building programme and radio control activity make Timperly sound like a fast moving club.

SHARSTON D.M.S. scored 21:51 in the *Model Engineer* team glider comp, top individual being E. Helliwell and his *Inch Worm;* he also happens to be Club Champ for the second year running, with seven 1sts and three 3rds in ten comps entered. Four members have A.P.S. *Creeps* on the way for the new season.

Ireland

The **DROGHEDA M.F.C.**'s Fifth Annual Rally at Butlin's Holiday Camp, Morney, was a great success, due mainly to the pleasant increase in entry. Tony Morelli of Dublin won the Butlin Trophy and at the same time took honours in both classes of team racing. J. J. Carroll (Dublin) won open stunt, and J. Evans (Shankill) the class for flying scale. Prizes were presented by Alderman L. J. Walsh, the Mayor of Drogheda.

A tragic accident in a Tiger Moth near Dublin ended the active life of Billy Kenny, founder of the Mount Argus and Drimnach aeromodelling club and we are sure that all who knew him will join me in extending sympathy to his dependants.

Scotland

At the West of Scotland Area C/L Gala held recently, Class A attracted an unusually large entry. **PRESTWICK M.A.C.** had two models in the final, both powered by Muir tuned engines. The "Tiger Terror", lapping at over 90 m.p.h., came in first for the Harris/Muir team.

R. Yule is champion of **BUCKSBURN A.I.T.** with Ron Robertson 2nd in his first year of contest flying, using a *Khamseen* and a *Borderline*. Club won the Strathmore Trophy after a stern fight with **MONTROSE** and issue the hope that others in the League will pull their socks up.

Pen Pals Wanted

From England: For Marcello Taddei, Bressanone (B2), Italy, a control-line fan. Ing: Jan Hajic, Praha XIV, Kro. Zelenypruh 357, Czechoslovakia, a radio control fan. Kaps Pawel, Siemiradzkiego 6 m57, Kutno, Poland, an aeromodelling instructor.

From U.S.A. or Canada: For Kevin Harris, 10 Walsh Road, Westown, New Plymouth, New Zealand, 14 years old. Alan Wilkes, 179 Williamthorpe Road, N. Wingfield, Nr. Chesterfield, Derbys., 13 years old. Master Harrison, The Luckey Hills School, Rednal, Worcestershire, 11 years old.

And so, to sit back like Buddha and contemplate another month of waiting for your reports, I sign off as usual as

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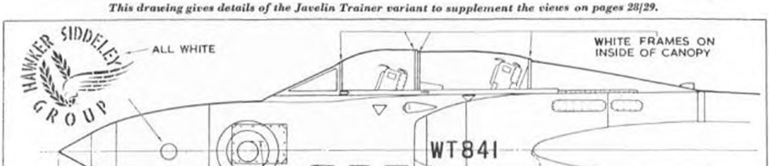
1957 S.M.A.E. COMPETITION PROGRAMME

Date	Event	
17th March	GAMAGE CUP: Unrestricted Rubber	De-centralised
31st March	S.M.A.E. CUP: A/2 Eliminator; KEIL TROPHY: Team Power	Area Centralised
28th April	GUTTERIDGE TROPHY: Wakefield Eliminator; LADY SHELLEY: Tailless Eliminator	Area Centralised
19th May	ASTRAL TROPHY: Power Eliminator; WESTON CUP: Unrestricted Rubber	Area Centralised
9th June	BRITISH NATIONALS: THURSTON CUP: Unrestricted Glider; SHORT CUP: 2·5 c.c. Class PAA Load; GOLD TROPHY: C/L Stunt; S.M.A.E. TROPHY: Radio/Con.; INTERNATIONAL TAILLESS; DAVIES TROPHY: Team Race A; SPEED: All Classes	Centralised

This drawing gives details of the Javelin Trainer variant to supplement the views on pages 28/29.



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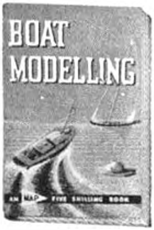

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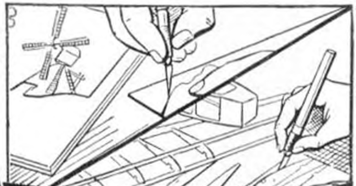

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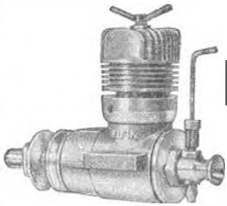

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Satisfied Customers . . .

Almost every post contains a letter or a newspaper clipping with news of a record flight or competition win, from yet another "satisfied K.K. customer". Here are a few typical samples from our postbag.

Dear Sir,
You may be interested to know of the performance of my "MINIMOA" glider. On Saturday, May 17 at Epsom, it did a flight of 4½ minutes and a week later, May 24 at the same place, it flew out of sight and was fortunately returned the next day from Morden — a flight of approximately six miles. These are just two of the excellent flights I have had with the model. D. J. T., Morden, Surrey

Dear Sirs,
You may be interested in a flight made by one of your "POLARIS" glider models, which took place on Sunday, August 19 at Barbondale, n'r Sedburgh, Yorkshire. A much repaired Polaris model was launched by hand about half-way up a steep hill. The model flew steadily across the valley and then commenced to gain height, flying in large circles. Its progress was followed with the help of field glasses for about a quarter of an hour, when it disappeared from view almost straight overhead. It was last seen flying strongly and still gaining height at an estimated altitude of 5,000 ft. P. S., Dent, Yorkshire.

Dear Sirs,
On Sunday, April 14, I was flying my Keil Kraft "INVADER" and launched by winch, the glider was timed 31½ minutes O.O.S. I have witnesses of the flight. R. A. D., Hereford

Dear Sir,
May I compliment you on your "ACHILLES" 24 in. duration kit. I bought one recently, and I was amazed at its low cost and simple building. I first flew it on the Chester race course and I have constantly had flights over 1 min., and in one flight the plane flew for 2 min. 3 secs. Its stability and steady flying are all that could be desired. My next kit shall be the "AJAX" and I hope it flies as well as the "ACHILLES". W. E. M., Bebington, Yorks.

Dear Sir,
On Sunday, September 2, near Huddersfield at 3.30 p.m. my Mills powered Keil Kraft "SLICKER" made a flight of 15 minutes on a 20-second engine run. I feel that this was an outstanding flight, even for a Slicker, and therefore worth while bringing to your notice. D. L. B., Goole, Yorks.

Dear Sirs,
On Sunday, July 20, my Keil Kraft "COMPETITOR", on its second flight, and with 400 turns on the motor, was timed out of sight after 5 min. 30 secs. The flight was timed and witnessed by several persons. P. N. C., Kingsbury, N.W.9.

Dear Sirs,
May I offer you congratulations on your really excellent model "AJAX"? At the school we have a number of various types of machines, but the Ajax wins every time! I myself have three of this make and for consistently good flying, I have never seen any machine to come up to it. M. F., Birmingham 27.

Dear Sir,
I recently purchased a Keil Kraft "PHANTOM" control line model kit, and I am very pleased with the result. I find that the model is everything you claim for it, I am a beginner to C L. flying, but I find the Phantom is an ideal trainer. The construction is extremely robust, as witness by the fact the model did a wing over and crashed nose first into terra firma (due to my inexperience), and all that came adrift was the detachable cowl. C. G. B., Coventry.

Dear Sir,
I have made a Fairey Gannet, "Spitfire", S.E.5 and D.H.110 and I really think your kits are wonderful, because they are instructive and fun to make and they turn out very well.
They also show that you go all out to please customers. P. M., Sarratt, Herts.

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