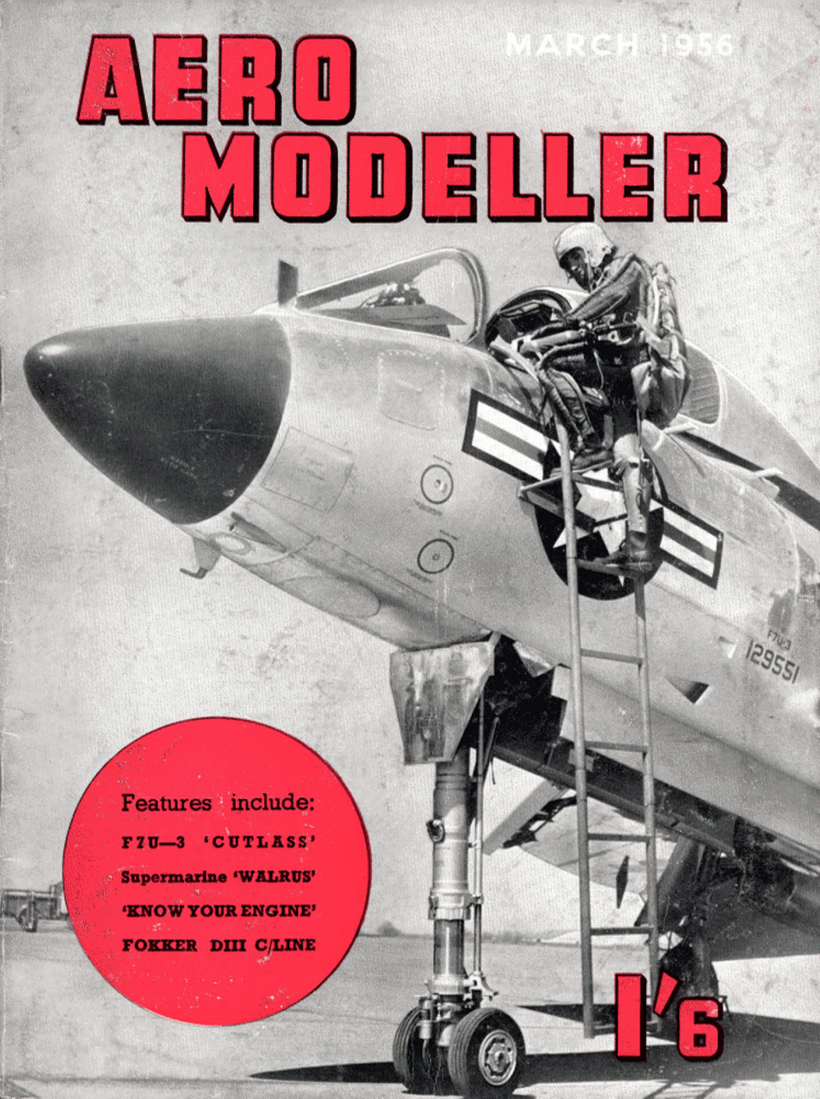
MARCH 1956

AERO MODELLER



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Supermarine 'WALRUS'

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FOKKER DIII C/LINE

1'6

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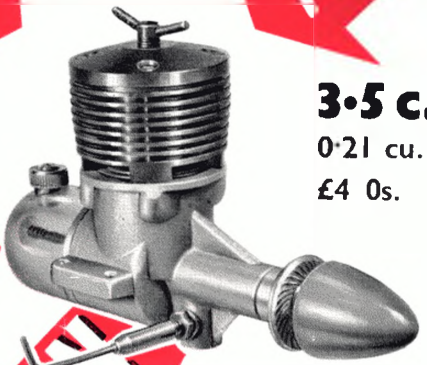
RELIABLE!

POWERFUL!

RUGGED!



3·5 c.c.
0·21 cu. ins.
£4 0s. 11d.

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You don't just buy a "Manxman", but make an investment that will see you through to the end of your modelling days. For the bigger free-flight model, radio job or control line stunt model its the ideal motor, with plenty of power throughout the rev range yet docile, easy to start and as flexible as you could wish.

Integral, crystal-clear plastic tank; rotary shaft induction; red anodised cylinder head and streamline spinner; upright or inverted running; coupled with superb engineering finish both inside and out make this the engine of the year. Supplies will be at your local model shop shortly after this advertisement appears so go along and prove our contention that the "Manxman" is **"a real man's motor".**

"Engineered to last a Modelling Lifetime" by

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HILL'S MEADOWS · DOUGLAS · ISLE OF MAN

THE PIONEERS OF RADIO CONTROLS

E.D. still lead the way!

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A Radio Control Unit completely wired and ready for use in your Model Plane or Boat, supplied with either soft or hard valves. This revolutionary set provides five different aerial tappings which enable the aerial load to be matched to the valve. A new valve is worked on the A.1. tapping for maximum sensitivity. When required 1.5 M.A. current becomes unobtainable the A.2 tapping will give a further period of sensitivity. This procedure is used progressively through all five stages, thus lengthening the life of the valve by five times.

Simplicity itself to instal and most economical in use.

PRICE COMPLETE ...	£11 18 6
Receiver and Escapement, Hard or Soft Valves ...	£6 8 11
As above, less Escapement	£5 3 9
Transmitter and Aerial ...	£5 11 4

Radio Control Equipment which will enable the user to operate independently, more than one control, is still in demand.

The system of Tuned Reed, pioneered by E.D. has, after long and exhaustive tests, proved the reliability and ease of control of this system.

Success after success in competitions has proved that there is nothing to compare with the Tuned Reed System developed by E.D.

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Tuned Reed — 3 Channels

FOR MULTIPLE REMOTE CONTROL OF MODELS

The last word for the control of all models which demand progressive, personal and accurate following of multiple orders.

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The receiver uses standard hard valves throughout, with an average life of 3,000 hours.

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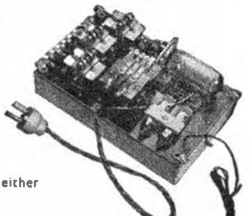
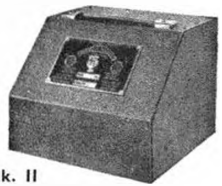


	Senior Model	Miniature Model
PRICE COMPLETE less Escapement ...	£24 1 9	£20 9 7
RECEIVER, 3 Hard Valves ...	£14 12 0	£11 13 6
TRANSMITTER, CONTROL BOX and AERIAL ...	£9 9 9	£9 9 9



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MINIATURE 3 VALVE RADIO CONTROL UNIT

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A standard battery pack will give over three hours continuous operation with a receiver and batteries weight of only 10¼ ozs.

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Receiver (3 Hard Valves)	£10 19 0
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A JOY TO BUILD and A PLEASURE TO SAIL

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MOTOR CABIN CRUISER

The design is based on ocean going cruiser lines and beginner or expert can take pride in the finished result. Simplicity of construction is a feature which will appeal to all. Performance and appearance is excellent and will cause comment wherever sailed. Designed for 6 or 9 volt electric motor, which will produce better than scale speed or, for the speed enthusiast, up to a 1 c.c. diesel. Cabin space allows for installation of Radio Control Equipment, batteries, etc., below decks with locking covers to protect valuable equipment from the water.

Dimensions: 31" overall length, 9" beam.

Price Inc. P. Tax £6-4-9

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MOTOR CABIN CRUISER

A Junior model of the *Silver Dawn* Cruiser, of basically similar design and the same simple type of construction. Although of relatively small dimensions, *White Cloud* is an impressive model when complete. Designed for any standard 3-5 volt electric motor. Cabin space allows ample room for drive gear and batteries.

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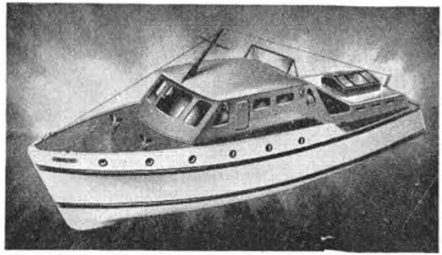

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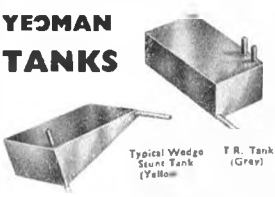
YEOMAN TANKS



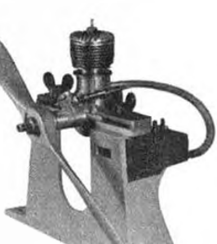
Typical Wedge Stunt Tank (Yellow)

T.R. Tank (Grey)

COLOUR CODED SERIES

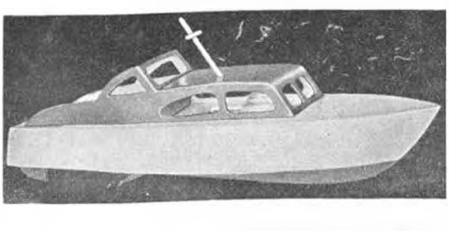
STUNT. Fuel proof coloured, outlets and vents take standard fuel tubing. BLUE: (1½ × 1½ × 1 in.) 2/6. RED: (1½ × 1½ × ¾) 3/9. YELLOW: (2½ × 1½ × ¾) 4/-. GREEN: (2½ × 2 × 1¼) 4/3. TURQUOISE 3/3. TEAM RACE TANKS. Exact to specified size. BROWN (1½ c.c.) 2/3. GREY: (2½ c.c.) 3/6. MAROON (3½ c.c.) 3/-. Safety margin allows for fuel lead capacity.

Yeoman TEST STAND



Carefully designed to suit the requirements of all power modellers, this test stand will give you a lifetime of service. It will take any size of motor, upright or inverted. The quick release clamps can be mounted vertically to accommodate radial mounted engines and a clip is provided to hold a fuel tank. Sturdily built in cast aluminium, the stand now has an improved sandblast finish and is available at your local model shop.

Price 15/-



YEOMAN MITE

Length 13 in. Beam 4 in. For Small Electric Motors

THIS New All Balsa Prefabricated Cabin Cruiser has been designed for ease of construction combined with elegance of appearance. All parts are ready die-cut and press straight out of the wood sheets, ready for assembly. Detailed plan, exploded assembly view, detailed instructions. All parts ready for assembly, and inclusive of propeller, prop shaft, prop tube, rudder and tube, rudder friction bar, connecting wire from motor to battery, sandpaper, etc. Power Unit: As designed Mite can best be powered with an Electrator. Other units include Ever Ready TG 18, 18B or 18E, Frog Tornado.

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These planes offer you a greater chance of success than any others

STUNT QUEEN

40-in. span Nationals Gold Trophy Winner. An outstanding stunt design with the lines of a team-racer. Very rugged construction. Monocoque fuselage. Sheet balsa tail surfaces. **25/6**

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38-inch wingspan

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The last word in modern free-flight power design Kit contains plans and parts for either a short nosed (Allbon .5, E.D. .46, Frog 50) or long nosed (Mills .75, Amco .87, E.D. Bee) version.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

2 MORE 1955 'FIRSTS' BY KK

CESSNA 170!

Cessna 170 kit, 36" span. **22/-**

1st. Germany-Austria Model Airplane Contest in Frankfurt. (FF flying scale event.)

1st. USAFE championships in Wiesbaden. (FF flying scale event.)

Also in the K K Super Scale Series are:

PIPER SUPER CRUISER (40-inch span) ... **22/-**

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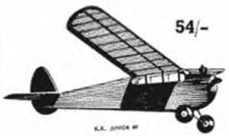
Also distributors for E.D., E.C.C., BRITFIX, and AMCO.

The number of competition wins by **KEILKRAFT** models of all types in the past and present prove this to be true.

Many International and local club events have been won in C/L Stunt, Team Racing, Radio Control, Glider, Free Flight Duration and Free Flight Scale by modellers flying standard **KEILKRAFT** kit designs. **YOU** can win that next club event if you choose your model wisely.

FOR MODELS THAT FLY——BUY KEILKRAFT



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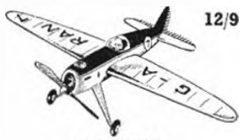

12/9

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24-inch Span Class A Team Racer
The top kit design for Class "A" racing. Well-known for its easy handling characteristics. Plan shows four different engine installations and drawings for making a neat 1.5 c.c. fuel tank.

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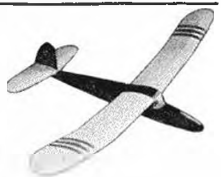

The book for all beginners

1956 KEILKRAFT HANDBOOK

Contains everything that you need to know to start you off in this fascinating hobby. Articles on building and flying model aircraft, control line flying, miniature diesel motor operation, etc., plus a complete illustrated catalogue of the famous Keilkraft range of over 100 model kits and dozens of accessories.

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This 27-inch span rubber model is the finest value in rubber kits on the market today. Quite simple to construct, it has a fine semi-scale appearance with a steady performance. Flying in the Thameside Winter Scramble it totalled 10 minutes 45 seconds to win—undamaged despite continuous rain and a high wind.

27 inches span, 24 inches long, powered 6 strands ¼"-flat.

KIT CONTAINS.—*All balsa strip and printed sheet, ready-cut fins and propeller blades, nose assembly drilled and shaped, wire, wheels, brass bush, cement, celluloid, coloured Modelspan tissue, plan and instructions.* **7/6 inc. tax.**

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The kit includes pre-cut fuselage sides and the completed model is very robust and full of flying—many flights of over three minutes have been reported.

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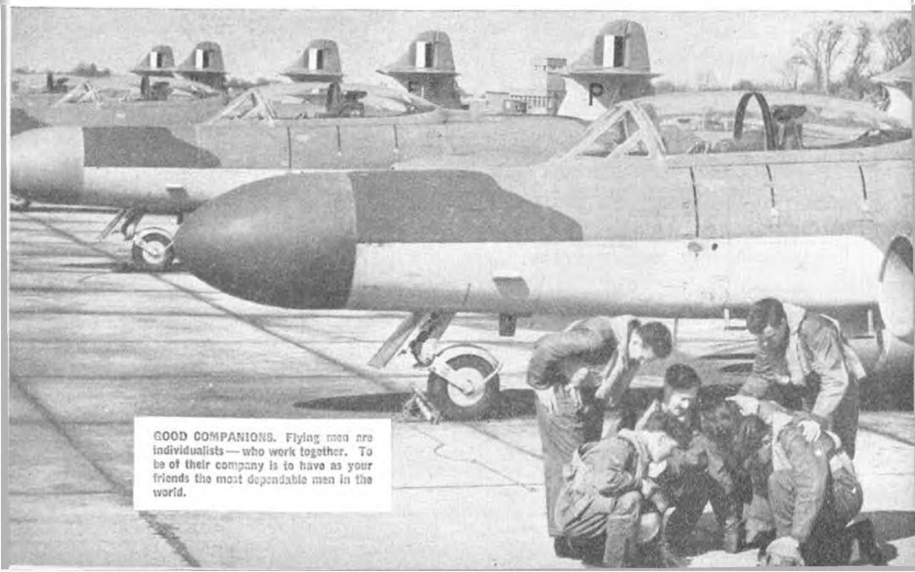

GOOD COMPANIONS. Flying men are individualists — who work together. To be of their company is to have as your friends the most dependable men in the world.

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You can now be granted a Direct Commission as pilot or navigator for a limited period or for service right up to pension age. There are further details of these two schemes and a full description of life in the R.A.F. in Air Ministry publications, that are yours for the asking. Your first step is to write for them, stating date of birth and educational qualifications, to the Air Ministry (A.M.301a), Adastral House, London, W.C.1. They are well worth reading.

The Royal Air Force

Flying ...and a career

AERO MODELLER

"Covers the world of Aeromodelling"

VOLUME XXI
NUMBER 242
MARCH 1956

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

★

Special features

★

Regular features

★

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

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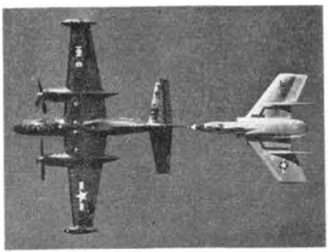
Editor's Postbag

CORRESPONDENCE IS THE lifeblood of any magazine. It stimulates the editorial viewpoint and is the means by which the editor gauges reader reaction to the contents of his magazine. From complaining letters he knows that which is unappreciated, from enquiring letters he knows what is lacking, from appreciative letters he knows that current articles are well received. It is heartening, therefore, to witness the unending flow of correspondence that arrives at the AEROMODELLER offices, and significant that your Editor's daily postbag contains a sizeable proportion of gaily coloured airmail envelopes, with a variety of foreign stamps sufficient to inspire the average philatelist.

Aeromodelling, like many specialised hobbies followed by people of intelligence, has a truly international flavour. We would go so far as to say, that it promotes more international goodwill and interchange of racial ideas than high sounding institutions such as U.N.O., U.N.E.S.C.O., etc. Apart from regular overseas correspondents who maintain a steady stream of invaluable local information which ultimately bears fruit in "World News", we are constantly reading fresh signatures from every quarter of the globe. Many of these enthusiasts do not have the advantage of a fellow modeller with whom to discuss matters, and it is here that the "Aeromodeller Reader Query Service" comes into its own. This service is at the call of any reader for the price of a stamped addressed envelope, and every effort is made to help with the knottiest of problems. We do ask that letters are kept brief and to the point, as our staff cannot spend all day on one particular query. Obviously there is a limit to the amount of information we can give in a letter, and we rely on our readers' common sense in this respect.

In this issue will be found voluminous correspondence on the vexed subject of World Championship Rule Changes as we considered it our duty to give space to the lively comment which came from the sporting side of international aeromodelling when the new rules were announced. We are, however, just as interested in the activities and performance of the ordinary weekend modeller as we are in the opinions of the personalities of the contest world. We want to hear of your successes, your failures, your discoveries, and your ideas. So keep the editorial letter box rattling for by so doing you will be shaping the future of your favourite magazine.



The flying wing Cutlass fighter is no longer a novelty and we accept its unusual outline as yet another approach to the quest for speed and efficiency. *At right*, the Cutlass in feeding position, takes on fresh fuel from an AJ-2 Savage via the British-invented "Probe and Drogue" system.

HEARD AT THE HANGAR DOORS

The Sharks Teeth fly again

Solid modellers will be interested in the Sabres of 112 Squadron, based at R.A.F. Bruggen, as shown in our heading picture. Story behind this distinctive marking is that, when the 2nd Tactical Air Force in Germany decided to adopt distinctive markings for its fighter squadrons similar to those used by home defence units since the early twenties, one squadron made a special request. For traditional reasons 112 Squadron wanted to decorate its aircraft with sharks teeth as painted on its Tomahawks and Kittyhawks in the Western Desert during the second world war.

The Air Ministry rule is that fighter squadron markings should broadly comform to geometric patterns e.g. squares, triangles, rectangles etc., but gave approval in this instance with the result that 112 Squadron Sabres now have a wicked look on their faces.

Famous Biplanes

Whilst on the subject of solid modelling it would seem that our new series on the construction of 1/48th scale biplanes has been well received by scale enthusiasts, to judge by letters that followed publication of the Curtiss SBC-4 Helldiver in the February issue. These articles will be appearing bi-monthly and in the April issue we shall be featuring the Fairey Fantome, probably one of the most attractive biplanes ever designed. We invite suggestions for future subjects in this series and remind readers that 1/48th scale drawings are available of *all* the aircraft which have appeared to 1/72nd scale in our "Aeroplanes in Outline" and "Aircraft Described" features.

Russian records

Recent F.A.I. news gives details of new records recognised by the International body. One of these carries the distinction of absolute World Record, the Russian Ivan Ivanikov setting up a speed of 275 k/hr. (170.8 m.p.h.) in the jet section of Control Line Speed. The highest speed recorded in Great Britain is that set by R. Davenport on the 11th July, 1954, with a figure of 152.17 m.p.h. using a 10 c.c. engine, so it is obvious we have a long way to go to catch our Russian contemporaries.

Another Russian, Petr Velitchkovski, just exceeded the requisite 2% increase to push Frank Bethwaite's (N.Z.) radio control duration record into the background, the new time for Record No. 20 being 3 hr. 6 min. 38 secs.

One further record for publication (in addition to that for Record No. 27 mentioned in our columns last month) is No. 22, height-above-the-piont-of-departure for radio controlled models, the successful applicant being the well-known Jean-Pierre Gobeaux of Belgium whose flight of 1142 metres made on the 15th August, 1955 has been officially recognised.

For those British modellers who may be interested in International Record attempts, the following categories are entirely open, no claim having been made to date:—

No. 11 Height—Rubber driven Helicopter
No. 12 Speed— ,, ,, ,,
No. 13 Duration—Power driven Helicopter
No. 14 Distance— ,, ,, ,,
No. 15 Height— ,, ,, ,,
No. 16 Speed— ,, ,, ,,
No. 21 Distance—Radio controlled aeroplane
No. 25 Distance—Radio controlled Glider
No. 26 Height— ,, ,, ,,

Sid Allen Memorial Fund

A number of further donations have been received towards the above Fund following publication of the list and appeal in our January issue. At the time of going to press the position was as follows:—

	£	s.	d.
Previously acknowledged	20	10	6
West Essex Aeromodellers	1	2	6
M. Coxhill		10	0
I. Martin		10	0
M. Willaret (Spain)		10	0
Pacific R/C Society (U.S.A.)	2	0	0
S. W. Stull	1	1	0
I. P. Webster		10	0
Bob Linn (U.S.A.)		15	0
Cristall Athletic and Social Club		10	0
M. L. A. Andrews		2	0
Regents Park M.F.C.	1	0	0
"Rebels" M.A.C. Maidenhead	1	1	0
Bushey Park M.F.C.	2	10	0
	£32	12	0

S.M.A.E. fund appeal

The following letter received from the S.M.A.E. speaks for itself, and we trust that our readers will respond generously in their support of this very vital appeal.

"*As a result of the magnificent performance of our team in the 1955 World Championships held at Weisbaden which resulted in Great Britain winning both the individual and team World Championships for power-driven models, the S.M.A.E. has the*

honour to run these two World Championships in this country in 1956.

"The date August 4th to August 6th has been fixed on the F.A.I. Calendar for this event which will be run at Cranfield, and the Society is looking forward to the opportunity of welcoming a record entry for this event and repaying in some measure the welcome which has been extended to our teams when they have travelled abroad in recent years.

"Based on previous experience the running of this contest will involve the Society in an expenditure in the neighbourhood of £1,000, which is considerably beyond the normal resources of the Society and it becomes necessary to appeal to all interested in the sport and development of aeromodelling for help in raising the required funds. All avenues for raising money should be exploited by clubs and individuals without delay.

'Let us show the rest of the world that we are not behind in organising ability and that we can at least match their hospitality.

"Subscriptions to the contest fund should be addressed to the Secretary of the S.M.A.E., Londonderry House, 19 Park Lane, London, W.1."

A. F. HOULBERG
Chairman.

Likes and Dislikes

Following the paragraph in our December 1955 issue entitled "What did you like best" we received a number of cards from readers, some as far distant as the U.S.A. Dislikes include control line plans, this, expressed by a free-flight enthusiast; contest reports, this by a scale enthusiast. In short, many of our critics tended to allow personal tastes to bias their choice of magazine content, which is not altogether suprising.

In general, contest fans were more outspoken with their criticisms than the rest, one of their main points being a dislike of results which only give the top three places. This we have done to economise on space on the assumption that detailed results were obtainable from the S.M.A.E. lists circulated to all clubs. We can only assume that the inevitable bottleneck of Club Secretaries who "stick" to results is sabotaging information, and will endevour in the coming season to give results down to the first 12 places. To give full results is impossible, shades of last season's K. & M.A.A. with 254 entries! We were also taken to task for giving several small photos in contest reports instead of fewer pictures of a larger size, but with more discernable detail, which is a point worthy of consideration. Same correspondent states we give too much space to overseas modelling at the expense of coverage of British modelling. Answer here is that overseas sales of "AEROMODELLER" represent one-fifth of the total readership and we certainly do not devote this proportion of space to overseas coverage. In addition we are certain that the majority of our readers are keenly interested in the activities of modellers in other lands, and shall continue to provide topical and informative "World News".

Another popular misconception quoted on several postcards was in the following vein: "'AEROMODELLER' is a *model* magazine. Why do you devote space to full size aircraft? This can be obtained from the many full size magazines.' All we can say to this is "Pity the poor solids enthusiast for whom these features are prepared. Isn't he entitled to his pound of flesh? And why should he have to buy another magazine when it is our job to cater for his needs in a specialised form that cannot be obtained from other journals.

Yet another criticism was the "good old days" chestnut, i.e. "Look back over the postwar "AEROMODELLERS' and notice how the magazine gets less and less interesting", etc., etc. Well we do look back through our files very frequently, at some things we glow with pride and at others blush with shame, but on a general basis know that the standard of the magazine has improved tremendously since the "good old days", as indeed it should.

On the "likes" side of our postcards we were complimented even by the contest boys, on the standard of our plans. Scale plans earned special mention, although one correspondent thought our drawing of the P.1 "a little imaginative". He was right at that, but even now there is a severe shortage of information on this particular aeroplane. Free flight scale features were appreciated by many, and our technical, as distinct from theoretical articles, earned praise.

In general the average reader is well satisfied with the modelling material we provide and "mixture as before" sums up his requirements.

One thing is certain, that we cannot do this without the support of our readers. Only by their letter, complimentary and otherwise, can we accurately gauge a balanced editorial content. For this reason we are giving a free 6/- voucher to *all* those people who were interested enough to send in a postcard. The prize of one year's Free Subscription for the best postcard submitted goes to reader M. W. Wilson of Guildford who showed appreciation of the "other fellow's" requirements; was the only man to point out our P.1 mistake; and made sensible suggestions for future articles.

Turbulent Prices

The Popular Flying Association informs us that the price of £6 per set of working drawings for the light French aircraft, the "Turbulent", is incorrect —though we were quite in order as the lower price was that quoted a short while ago. We understand that later versions, accompanied by a full translation of all instructions and remarks on the drawings, are now priced at 9 gns., which includes one year's annual subscription (£1 1s. 0d.) to the Association.

FAI T ACCOMPLI*

The Editor does not hold himself responsible for the views expressed by correspondents in these columns.

"I still like the new rules!"

NEVER BEFORE have we received so much correspondence on one single subject as on the announcement that for 1952 there will be changes in both the Wakefield and F.A.I. Power model specifications in an endeavour to reduce the possibility of multiple ties for first place.

The changes are:

(A) Wakefield motor weight reduced from 80 to 50 grammes.

(B) Power model loading to be doubled to 400 grammes (14.12 ounces) per cubic centimetre.

(C) All flights to be hand launched.

Extracts have been taken from letters received in criticism of the changes, limiting those published to comments from well-known personalities and competitors; but it should be emphasised that *all* letters in favour are included.

First, from British Team members, starting with Roy Monks who has represented the country in Peace and A2 finals as well as being a prominent Wakefield flier. His Birmingham clubmate Phil Read, of the 1955 Wakefield team, endorses the same views.

"When we consider that the maximum scores at Fanthorpe were achieved in the following order: A2 first day Nil; Power second day 3; Wakefield third day 7, it surely follows that the increase in thermal activity has some bearing on the matter.

"We see no reason for panic changes to be made to the Wakefield specification on the above evidence. Indeed we think there are better reasons for leaving the specification alone. The last changes to the Wakefield specification were accompanied by a disappearance of many of our top Wakefield fliers, and a fall in entries. It seems improbable that this was coincidence.

"The only changes we need are in the contest rules. We offer two suggestions which should take account of model development.

"(A) Five flights of 3 min. maximum. If any competitor completes his first three flights with three maximums, 4th flight to be 4 min. maximum; if this also is achieved, next to be 5 min. maximum. If even 5th flight reverts no 2 min. maximum counts, any extra time scored only to be used for deciding team ties.

"(B) Or five flights of 3 min. maximum.

—RAY MONKS.
—PHIL READ."

And from the 1955 World Power Champion. The graph he mentions is based on the longest flight time of each competitor and certainly does indicate that a 3.30 maximum would have averted a fly-off at Fanthen.

"The first cause for complaint about the new rules is that they were passed long before the opinions of the modellers had been obtained; this has happened before and I hope that something definite can be done to prevent its recurrence in the future. I feel that those most concerned in F.A.I. rule changes are those who fly in the championships, so would it not be possible for a questionnaire to be completed by all competitors at the 1956 contests before any changes are made?

"Any change in model specification means not only that a great deal of hard work expended on developing a model is wasted, but it can also mean that one's stable of five or six F.A.I. models, which have taken three or four years to collect, become useless for future contests. The fact that the models can be used in open contests is no consolation to the serious modeller who only builds to F.A.I. formulae.

"The new power model will be very large with a slow and very easily trimmed climb, thus all the skill and excitement of flying a fast model will be lost. The accent will be on motors—special motors perhaps—even fitted with gears, will prove to be a definite advantage—surely nobody wants this type of Contest?

"The luck element will increase, for the new machines will attain low height and relatively good glide will be drastically affected by thermals and downdraughts, perhaps the position would be even worse than with Nordic gliders.

"If any changes are definitely decided as necessary to reduce the chance of a large fly-off, then I suggest the motor run limitation be increased to 3½ minutes and/or the motor run cut to 12 sec., in addition perhaps even an extra flight could be added to give a six flight contest. I enclose an engineering graph showing the number of competitors who would have reached the fly-off at Fanthen if the maximum flight time had been set at various times less than 180 sec. By extrapolation it is clear that if the maximum had been raised only 15 or 20 sec. then a tie would have been averted.

"It is thought that timers are too unreliable to set for less than 15 sec., then why not have a total motor run of 60 sec. for five flights with a maximum per flight of 15 sec. In this way one could aim exactly for 12 sec. and any small deviation could be corrected next flight, the last flight being the only flight needing great care.

—MICHAEL GASTER."

Noted Wakefield and A2 flier, currently an F.A.I. power enthusiast as well, John O'Donnell has more points to offer.

"I very definitely do not like the reduction in motor weight and increase in power loading; and feel that the proposals and decisions were made on the basis of the results of the 1955 World Championships, without due allowance being made for the phenomenal weather conditions. The abolition of the R.O.G. Rule is more than welcome, and is a long-overdue simplification of contest requirements.

"Far too much emphasis will be placed on the power plant as compared with the model aircraft. This will immediately put Free-Flight Power into the same category as C/L speed, *i.e.*, Model Engineering pure and simple, and of very limited appeal to aeromodellers. The specially re-worked engine will be almost a necessity at 400 gm./c.c. and that is something quite beyond the facilities or finance of the average modeller.

"Normal 'Still-Air' Duration will drop to approximately the 2-in minute mark, or below; and contests will deteriorate to the thermal-catching gamble that Glider events already have become.

"The necessity for a contest flier to have two sets of models (one for National and another for International specification events) will hardly encourage interest in the World Championships.

"My ideas of suitable rules for International Contests (or indeed for any events) can be condensed into the following —reasons and explanations being in brackets.

"1. 3:1.90 max. (A higher max. will probably aggravate the aerodrome crop situation.)

"2. Five flights. (A large number of flights tends to reduce the luck element. Five flights can be handled at World Championship meetings either by commencing the contests early in the morning or by extending over two days.)

"3. Unrestricted fly-off if necessary. (This should not be between more than a very small number of fliers if the remaining rules are suitable. The value of the fly-off can be increased by holding it at a suitable time of day and having the contest programme allow for it.)

"4. Two models allowed.

"5. No wing loading, power loading, cross section, minimum weights and/or area requirements whatsoever.

"6. Maximum span-plus-length figure to be 10 ft. (This is to cut out the large model's advantage on visibility and to ease transport difficulties. The actual figure is not critical, but should fit in with present model sizes.)

"7. Cylinder Head-Temperature. (This can be reduced as required as model development progresses.)

"8. Power: 10 sec. maximum motor run. (Ditto.) (Over engine-timers are more accurate over short runs. The *maximum* of time-keeping errors is not dependent on run.)

"9. Rubber: Distance between front and rear motor anchorages, hooks, bobbins, etc., to be less than 50% of the wing span, and/or less than 30 inches. No "pretensioning" of the motor (single skein motor only, *i.e.*, no return gears) allowed. (This rule will require careful definition. However, it will be easy to check without removal of the motor, and will give justifiable advantages to the builder of lightweight structures. As it depends on the model and not the motor a complete check is not needed every flight. Expressing motor weight as a percentage of all-up weight leads to indifferent structural design, and payload means heavily loaded and very fragile models.)

"10. Hand-launch for Rubber and Power.

—JOHN O'DONNELL."

In close running, after the leaders at the Trials and National events, Dave Posner has proven himself a maestro of the vertical climb He says:

"The fun will be taken out of F.A.I. power flying—(what are P.A.A going to do?) —and we're all going to have to build new models or use old F.A.I. ones for open comps. At the moment I do not fly light-weights as I will bet my F.A.I. jobs against any open one.

"Why not reduce the motor run to 12 seconds? Nine times out of ten I only have a 12-second run, and I've never done four maxes, or and increase the max to 4½ minutes. Models might change in time, but for the present the old ones would do.

—DAVE POSNER."

* *Liberal translation—you've had it—it's already happened!*

Most experienced of all Power fliers in the International sphere is Peter Buskell who writes:

"I am most definitely against the changes proposed as I expect is everyone who has put much time and trouble into developing a design which will handle high power. It is only when climbing fast that design problems become difficult and the *best* model stands a good chance of winning.

"Also the new formulae as an all-considered one; a 2.5 c.c. model needs to be a monster to stand any chance and I think they are quite big enough as it is. The alternative is to spend money on 1.5 c.c. engines which would be little, if any, use for open competitions; also the fact that the same model cannot be used in all contests will inevitably bring a big reduction in interest in the International class.

"All this rather than take the obvious step of reducing the motor run to 10 sec. which would have reduced flight times to below the 3-min. mark again. It's rather like going back to Kindergarten after some years in Grammar School.

—PETER BUSKELL."

More on the size of the model is indicated by a modeller in the Royal Artillery.

"Since 1952 I have been flying a power duration model of 980 sq. in. wing area, 37 oz. weight, and 30" tail area. It is in other words a double-sized 2.5 c.c. machine. This aircraft has a moderate Sigurd Isacson wing section, an A.R. of 11 and a fully cowled engine. It has been powered with an E.D. 1.46, U.T.V. 2.5 Reboding 29, and a Yukon 49. Only with a Dooling 29 does this machine perform, and then only with a 9 x 6 airscrew and a static r.p.m. of at least 14,000. The hull/wing/tail remainder is so slow that not even the wonderful glide can overcome the handicap. The Dooling takes this machine into a climb that is both safe and far from slow even by present-day standards.

"I would, therefore, suggest that it would be better to build a machine of about 600 sq. in. wing area and obtain a reasonable climb rather than build a large aircraft with a very poor climb.

—P. W. WILLIAMS."

The Competition Secretary of the Scottish N. Eastern Area feels strongly that his stable of prepared F.A.I. models will not be of use in 1957 and goes on to say:

"I agree that the fly-off position is unsatisfactory, but surely the most obvious solution is: 10 sec. engine run instead of 15 and 4 min. maximum instead of 3. Either or both these could be used and our present models could still be up-to-date. Is it small wonder that many modellers are taking up scale and sport flying? I only hope that the S.M.A.E. will lodge the strongest possible protest and that the British modeller will stand with them in getting the Power Loading rules at least withdrawn before it is too late.

"A word of encouragement to the F.A.I.—The abolition of the R.O.G. rule is very good!!

—KENNETH WHYTE."

From the many relatively unknown enthusiasts we select a typical taste of the power changes:—

"As maximum power will now be at a premium, the plain-bearing cheaper motors will be virtually useless and as manufacturers will not have to sacrifice power to keep the weight down to a reasonable level, I think we can expect a crop of new motors, with a corresponding strain on financial means. This means that the junior section will stand even less chance of making a good score, and if the juniors drop out there will be no need for the F.A.I. in a few years.

"We already have Payload contests, but after lifting 35 oz. the Payload model will be quite frisky by comparison.

"Why should we not suffer a simple drop to 10 sec. power run?

—T. M. UNSWORTH."

From Canada

Well-known for his magnificent "1,000 Hrs to make" Wakefields when a N. Western Area flier, Barry Haisman is now a leading light in Canadian flying and along with Canadian team-member Don Mackenzie offers this comment:

"1. The 400 grammes per c.c. power loading would produce a clumsy and *dangerous* model. We feel that a reduction of motor-run to 10 sec. would meet the case in the best possible way. If, however, it is agreed that the power loading should be raised, then a 25% increase, i.e., to 250 grammes, would be about the maximum permissable.

"2. For a new Wakefield rubber weight we still go for 60 grammes, partly on the grounds that the smaller figure would, for best results, necessitate fairly radical design changes, and at this point in the proceedings that is unfair to people who have models under construction, as Don. and others have at the moment. Furthermore, we are convinced that 75% of the future Unlimiter weight is a good figure to bring performance safely below 3 min. for a few years.

"3. These question may not be original, but we put them anyway: If English modellers didn't know of the new rule proposition, what chance had Canadian and U.S.A. modellers! Why did Chairman Houlberg allow discussion of such a vital proposal when he knew that it had not been discussed by his own national organisation? Again, re Canada and other faraway countries, no one is more interested in Wakefields than I—I was No. 1 man on the 1955 Canadian Wakefield team—I heard nothing about it.) And if we had not read it in "AEROMODELLER" would we when the *Buck* we would have heard of the rule changes!

—BARRY HAISMAN,
—DON MACKENZIE."

. . . U.S.A.

Over in California, Stan Hill, noted model designer and U.S. Power team member, 1953, wrote promptly:

"My reaction was much the same as that of every modeller and asked about this—HORROR and SHOCK!

"Skipping some of the more picturesque remarks the following is a consensus of opinion from the South California area.

"1. The proposed would defeat the nearly transportable size goal which was a major factor in choice of 2.5 c.c. of engine size (all agreed that size would range from 6-800 sq. in. wing for good performance).

"2. The time potential is too low. A good comparison may be taken from International P.A.A load (2.5 c.c. about 600 sq. in. wing and 35-40 oz.) in which 1 30-1 45 is excellent time.

"3. Almost half of F.A.I. fliers said they would stop competing in this category if the proposal is adopted.

"4. Most felt that a 50% increase in loading would accomplish what is desired without completely ruining the event.

"I've just completed a 10-in-engine *control line* flight for two Much I's that would fit the 1957 rules well with one engine not operating. Specifications are as follows:

Wing Area	800 sq. in.
Stab	240 sq. in
Weight	35 oz.

"The ship is rugged and silk-covered with no weakening of structure of a concession to lightness so you can well see that models could be very large indeed under the 1957 proposal.

—STAN HILL."

. . . Australia

Not all correspondents has been critical, and 1954 Wakefield Champion Alan King of Australia has this to say:

"There is no doubt at all that some change was necessary, and even though these rules may not seem particularly attractive in some aspects, I'm sure they will do more good than harm.

"I can't find much to criticise with the Wakefield rule, although more than ever all models' performance will depended on who has the best rubber.

"The power loading rule is surprising, to say the least, but in general I don't dislike the change.

"Overall, the rule changes will tend to reduce some of the skill involved in trimming gas models, but as performances were really getting out of hand there was not a good deal else that could have been done.

—ALAN KING."

Another Aussie in Melbourne, and a Wakefield flier of 20 years' standing, accepts the changes as a challenge to his ability.

"Three cheers for the F.A.I. They have taken a courageous and long overdue step to restore sanity to free flight; easily the most important rule change since the Wakefield weight was doubled 20 years ago. If I remember rightly, there were plenty of calamity howlers then, too. Anyone who objects to carrying the extra weight should not blame the F.A.I., but the motor manufacturers for selling too much HP. The alternative, of reducing motor runs to 10 seconds or even less, to my mind unthinkable—such machines would be little more than glorified hurl gliders.

"There appears to be a mistaken impression that the new rules will be harder for beginners. Actually the reverse should prove to be the case: the heavier models will be slower climbing and easier to trim. In short, they will behave more like true aircraft than demented skyrockets, with a consequent reduction in the rate of crashers.

"My only criticism is that the new rules will foster heavy construction, which is bad training, and I would prefer to see part of the increase in the form of a payload.

"As for the Wakefield, it has been obvious that something drastic would have to be done to prevent a repetition of the seven-man fly-off at Finthen!

JIM FITZLARTON."

. . . Italy

Italy's equivalent to Peter Buskell is Roberto Bacchi—always in the team and always near the top in the results, though not, apparently, keen under a lucky star when it comes to catching thermals. Roberto favours the changes and says:

"Reducing the rubber on Wakefield and increasing weight for Power will bring a better employment of the propulsive system, and requires more design study and engine tuning. While I agree with the power weight I do not like the fact that the power run is not changed: 15 seconds is too short; 20 seconds would be better, especially as current systems are not 100% reliable.

"I like the hand launching. No more quarrelling, especially now that A-1 C.O. is fashionable. It will be necessary to make the best of every propeller revolution, and research into fuels and props will improve the standard of model flying.

ROBERTO BACCHI."

"Remember the good old days, Bob? As much rubber as you liked and no arguments!"

FAIt accompli (continued)

Swiss View

Several times a member of Swiss International teams, and a much-respected and painstaking flier whose aeromodelling has earned him the honour of being trained as a Swissair pilot—one of the world's finest flying scholarships, writes . . .

"It seems natural that something had to go, but the manner in which changes were made is not in all cases acceptable to practical modellers. I am heartily in agreement with two points. Wakefield models have had such high performances this year that a rubber weight alteration was indeed necessary. Whether 50 grammes is the right one to choose is debatable. The introduction of hand launching for power models is also a good thing.

"The third alteration is quite a different matter. Models will continue to do maximums whatever the capacity of the power models, and this is an essential part of the rules. That is why I simply can't understand for the life of me this attack on the freedom of model design. The weight increase from 200 grammes per c.c. to 400 grammes per c.c. robs this class of its great attractions. The dangers and difficulties that can only be overcome through experience, practice and exact building will now all be obviated, and International power flying is reduced to a kind of 'week-end flyers'. The resulting model will climb like a pregnant duck and have a similar sinking speed. For a 2½ c.c. motor we get a total area of 83.3 dm² which corresponds roughly to a wing of 2½ metres span and 25 cm. chord, and who on earth will visit International competitions when they have to lug around a piece of luggage like that? Then we have to consider the high price of 1½ and 2½ c.c. engines: what a carve-up for the manufacturers! If a change is really necessary I should personally be in favour of something like 300 grammes to the c.c.—and only if it was forced upon us.

—BRUNO BACHLI."

Czechoslovakia . . .

Another International team member, whose qualifications have taken him to contests from Moscow to Weisbaden, is the noted Czechoslovakian Wakefield and A/2 man, Radoslav Cisek.

"It is going to be quite difficult with 50 grammes of rubber! I mean that 3 min. will only be reached with thermal aid. The modification from 80 grammes to 50 grammes is too great a jump. For power, the new weight will make good engines even more important.

—R. CISEK."

from Japan

That reaction to the proposed rules is worldwide is clearly shown by the number of unmailed express letters received on the subject from the teise ones who sent them copies of "AEROMODELLER" sent to them by airmail. Among them, Bunzo Yanagimachi of Northern Japan, a Wakefield, A/2 and Power flier of repute in his country, and a keen member of M.A.F.J. He writes a personal view on the rules, adding a few suggestions as well . . .

"I agree that models no longer need to take-off from three-points; but release should still be from the ground, touching by one point.

"Of the Wakefield motor weight reduction, I cannot approve and my suggestion is that the model should be increased in all-up-weight to 280 grammes, retaining the 80 gramme motor.

"If all flights for power models are to be hand-launched, I approve the new power loading figure; but I think the old rules are better if run-off-ground is retained.

"Lastly, the annual Championship contests should be held in a country more for the convenience of the interested nations.

—BUNZO YANAGIMACHI."

"3 min. will only be reached with thermal aid"

Italian suggestions

Some of the most beautifully-constructed models we have seen were the Wakefield designs flown by Italy's Edgardo Sadorin of Milan. Possessing the rare virtue of being a theorist who can apply his calculations to good practical use, Edgardo writes with his suggested estimations of expected performance.

"A reduction of Wakefield flight time could be obtained by increasing the weight of the model and leaving the rubber weight alone. Bring the total weight to 300 grammes and calling for an undercarriage with wheels, then you will have a more attractive model. I do not like hand launch, which is a departure from realism. The 1957 breed of models will be called 'Flying Things'.

"The increase of weight for power models is exaggerated and with such heavy designs we could only attain 3 min. using 25 to 30 sec. engine run.

"Summing up, a formula that would restrict the potential flying time to less than 3 min. and yet will retain aesthetic shape in the model would be as follows:

Wakefield—

Rubber	80 grammes
Model	220 grammes
Flying weight	300 grammes.—
	Time 2 min. 41 sec.

Power —

300 gm/c.c.	Engine run 15 sec.—
	Time 2 min. 11 sec.
400 gm/c.c.	Engine run 25 sec.—
	Time 2 min. 21 sec.

—EDGARDO SADORIN."

Official view—from an F.A.I. delegate

Also from Switzerland is pertinent comment by Chief Aeromodelling Instructor Arnold Degen in the Swiss magazine "Aero-Revue", official journal of the Swiss Aero Club. Said comment is particularly revealing as to the way the voting went on the subject of the Paper Rules, and was considered important enough to be translated into French as well as German, presumably to ensure that all Swiss modellers were completely au fait with the situation. Headed "Unbelievable But True", it described the changes and then went on as follows:

"You will not believe it, but this French proposition has, unhappily, been accepted by five votes (France, Italy, Belgium, Czechoslovakia and England) against three (Holland, Austria and Switzerland).

"This decision, which has further to be confirmed by the General Assembly of the F.A.I. (which will take place at Vienna in May, 1956) comes into force in 1957. At the present time a model equipped with a 2½ c.c. motor must weigh a minimum of 500 grammes.

"According to the French proposition a model furnished with the same motor will have to weigh in future 1,000 grammes. Consequences of this new rule on the dimensions of models are easy to foresee, such as we can show in the following example.

"According to the present formula a model furnished with a motor of 2½ c.c. must have a total surface of 42 dm² to obtain specific loading of 12 grammes to the dm². With the new formula, a model of this cubage capacity would have to have 83.2 dm² total surface to obtain the same specific loading. The dimensions of this model would be, for example span 240 cm. wing chord 25 cm. span of tailplane 100 cm. minimum weight about 1,000 grammes. The dimensions of such a model take on such unreal years and lead to difficulties of transport which will contest modellers (Swiss Translator's Note: It is amusing to consider that France and Belgium of the countries which, a spread the news rule are specially noted to Swiss modellers on account of the vexatious railway and Customs regulations relating to hand-luggage of too large dimensions. It is possible that the modellers of the French and Belgium teams could only go by car.)

"At the present time we use light wood (Balsa) for construction, but if we are to attain a weight of 1 kilogram we might just as well use lead! My personal impression is that, not only French politicians, but also French modellers (or those who call themselves such) have the gift of putting over all considered propositions.

"A model equipped with a motor of 1.5 c.c. with wing loading of 12 grammes to a dm² would have to have a total lifting surface of 50 dm² and weigh 600 grammes with span of 200 cm. and a chord 20 cm. to the wing a span of 70 cm. with a chord 15 cm. for the tailplane, weight of 600 grammes. Such a model would be bigger than the present models equipped with a 2½ c.c. motor.

"Naturally it is possible to build smaller models, but with a greater wing loading. A model furnished with the International motor for a motor of 1½ c.c. would have to be equipped with a 2½ c.c. motor, but its weight would be 1 kilogram and that would correspond to a wing loading of 20 grammes to a dm². Every modeller knows full well how important it is to have a low wing loading to obtain good performance. That is why we do not understand this new proposition for International competitions.

"As reason for this modification of rules it was put out that the present-day models fly too well, and have too many maximum flights.

—ARNOLD DEGEN."

Summary

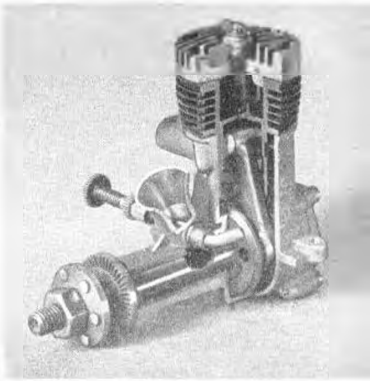
These viewpoints, and those of many other unpublished letters, indicate a general desire that the proposed rules should be revised in two ways. (A) That the Wakefield motor weight should be 60 grammes. (B) That the motor run for power be increased if the double-loading takes effect, or reduced if loading is left at 200 gm/c.c.—with greater support for the latter.

Of the suggestions made by correspondents, the following points can be extracted in order of the co-incidental support received for each. Were the matter put to open vote, we have little doubt that the order of the first four suggestions would remain unchanged.

- **(a) Make Wakefield motor weight 60 grammes.**
- **(b) Reduce Power Run to 10 seconds.**
- **(c) Reduce Power Run to 12 seconds.**
- **(d) Raise Maximum to 3 : 30.**
- **(e) Increase Power Run to 25 sec. with 400 gm/c.c.**
- **(f) Increase Power Loading to 250 gm/c.c.**
- **(g) Increase Power Loading to 300 gm/c.c.**
- **(h) Agree all rules as proposed.**
- **(i) Make Wakefield Motor 50% Wingspan.**
- **(j) New size specification (span plus length).**
- **(k) Raise Wakefield weight to 300 grammes.**
- **(l) Raise Wakefield weight to 280 grammes.**

Know Your Engine

PART I OF A NEW FEATURE THAT WILL EXPLAIN THE WHY'S AND WHEREFORE'S OF YOUR MODEL ENGINE



Japanese OS MAX-1 *in section reveals detail described in this new feature*

THE ULTIMATE performance of a miniature two-stroke engine is governed largely by its porting—the disposition and timing of those passages which permit transfer of the fuel mixture from tank to crankcase, thence to the top of the cylinder and, after firing, out through the exhaust. Usually the "timing" employed has to be a compromise. It can only be absolutely right for one particular speed, which means that it is less efficient at others. Timed correctly for maximum speed, the engine may be difficult to start because the porting is too "open" for low speed running. Timed for easy starting, the same porting arrangement may "strangle" the gas flow at a fairly early period on the speed curve, so the engine will not run very fast.

Manufacturing technique also enters the picture, and physical design limitations. What may approximate to "ideal" timing for a particular design may be costly to make and is ruled out in favour of a less efficient compromise so that the selling price of the engine can be held to a reasonable level. Or perhaps the "ideal" leaves the cylinder too weak so that it can distort, or even break. Let's start from the beginning and see what all this adds up to.

Prior to about 1948 almost all production engines in this country were of the side port type—the classic three port system where all the ports are formed in the cylinder walls, opened and closed directly by movement of the piston—*Fig.* 1. The intake tube supplying the fuel mixture *via* the needle valve and spray bar assembly (standard "carburettion" on model engines) is therefore attached to the cylinder, either centrally or to one side. "Side" port does not necessarily mean that the intake tube is attached to the *side* of the cylinder, although this is the more usual arrangement, for reasons which we will explain in a minute.

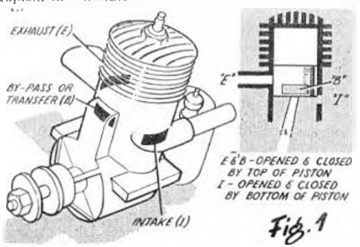


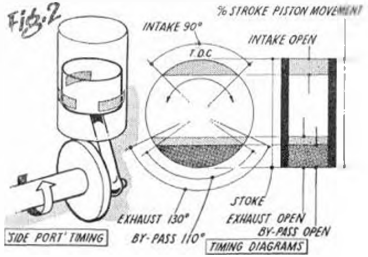
Fig. 1

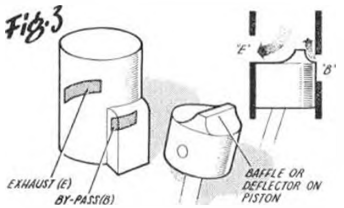
Simplifying the engine to just a cylinder, piston, shaft and con rod and intake tube, as in *Fig.* 2, the "timing" of the engine can be expressed in terms of crankshaft rotation (which is more usual) or vertical piston movement (which is a more correct geometric diagram). Either are quite easy to understand, and both are called timing diagrams.

Approaching the top of its stroke the piston must uncover the intake opening or port so that the lowering of pressure produced in the crankcase can draw in the fuel mixture, *i.e.*, the intake port is so positioned that it is uncovered so many degrees of rotation, or a specific fraction of the stroke, before top dead centre. In the case of the side port engine this timing must be symmetrical; *i.e.*, the same opening before and after top dead centre. It cannot be anything else. Also the actual "open" time is governed by the depth of the port opening in the cylinder uncovered. A typical design value is 90 degrees either side of top dead centre (T.D.C.). If excessively deep, *i.e.*, opening too early, this may cause too much blowback through the intake, interfering with carburettion.

Some time around T.D.C., of course, the mixture inducted from the previous stroke is fired (whether by spark, glow plug element or self-ignition is immaterial) and the push for the down stroke is provided by the rapidly expanding gases. Before the piston reaches bottom dead centre (B.D.C.) it must open an exhaust port for these burning gases to escape and a transfer port to transfer the fresh inducted mixture from underneath the piston (where it is being pushed down and compressed into the crankcase) into the upper cylinder.

The exhaust port opens first—a "standard" value being about 115 degrees (crankshaft rotation) past





T.D.C.—and again it is obvious that the "timing" will be symmetrical, the exhaust staying open until the piston reaches a corresponding point on the next up-stroke (in this case 130 degrees exhaust opening). The transfer port opens some 15 degrees after the exhaust and therefore for a period of some 100 degrees about bottom dead centre both exhaust and transfer are open. Gases are free to flow both out and in off the top of the cylinder. To prevent the fresh gases flowing straight in and out again is largely a matter of internal design arrangement. With exhaust and transfer ports diametrically opposed, for example (known as cross scavenging) a baffle or deflector fitted to the top of the piston (in practice a shaped piston top) will direct the incoming gases up and out of the way of the expanding, outgoing gases *Fig.* 3. A certain outflow of the incoming gases is not undesirable as this promotes proper "scavenging" so that the remaining mixture trapped in the top of the cylinder as the up stroke closes both ports is all fresh fuel-air mixture.

As before, timing is controlled by the depth of the ports. Extending the exhaust port (upwards) gives an earlier opening, but means that the burnt gases are free to escape whilst still highly compressed, hence some of the power available to push the piston down is wasted. The designer aims to delay the exhaust opening until most of the useful power in the expanding gases has been extracted, but, particularly with high speed engines, is forced to compromise, *i.e.*, between early opening in order to get the necessary time for transfer and maximum utilisation of gas pressure. If the transfer is opened too soon after the exhaust there is a danger that the burnt gases in the cylinder, still under pressure even if they are now escaping through the exhaust, will tend to blow down through the transfer, retarding the transfer of the fresh charge and producing very poor scavenging.

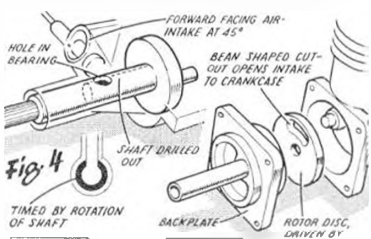
Some of the limitations imposed by timing can be offset by increasing the *width* of the ports, *i.e.*, increasing their actual area. It does not necessarily follow, however, that this will automatically improve the efficiency. Excessively large port widths may also weaken the cylinder unduly. With the side port engine, in fact, due to its inherent limitations at high speed, optimum port width is about twice port depth for engines of equal bore and stroke and a similar effective area of other bore/stroke ratios.

Although a flexible enough arrangement for low and moderate speeds, the chief limitation imposed by the side port arrangement is that it cannot induct enough fuel for high speed running. In other words, the intake port cannot be opened early enough without also having an excessive opening time *after* T.D.C. to cause blow-back through the intake. Some other intake timing system is therefore invariably preferred for high speed engines and since most modern engines are high speed types the sideport engine is now a comparative rarity.

The advantage of a high operating speed is primarily that the efficiency of a two-stroke engine tends to increase with speed and if a torque output can be maintained then the corresponding power output (being the product of torque and speed) will be that much greater. Thus the early pre-war types of engines which, perhaps, developed comparable low speed torque had a maximum speed of 5-5,000 r.p.m. could only develop a maximum power output of about one-quarter to one-third of its modern counterpart peaking at some 14,000 r.p.m.

Rotary valve induction

The two standard methods of providing asymmetric induction timing are the crankshaft rotary and crankcase disc type valves in which opening and closing points are independent of piston position and only related to it for



the purpose of timing. The principles are sufficiently well known to need only brief description — *Fig.* 4.

With the crankshaft rotary valve the port is a round or square hole cut in the crankshaft itself, opening into a hole drilled along the length of the shaft (and thus connecting directly with the crankcase). This port is timed by its appearance and disappearance past the intake tube let into the crankshaft bearing. This tube or carburettor is normally raked forwards, but not invariably so, although if a vertical tube is employed the end is nearly always cut off at an angle to produce a forward-facing entry.

The amount of forced draught produced by a forward-facing entry is quite small, as also are any improvements in induction resulting. It can be shown, however, that with a vertical squared-off tube, holding a piece of flat material above the end of the tube to deflect air down into it can result in improved induction, so some degree of forward entry would appear worthwhile. Most designers adopt a forward rake of about 20-25 degrees for the intake tube and then angling the top so that the actual entry is at about 45 degrees. A definite forward-facing entry, *e.g.*, the open end of the tube facing directly into the airstream, tends to make needle valve setting extremely critical and has little to recommend it.

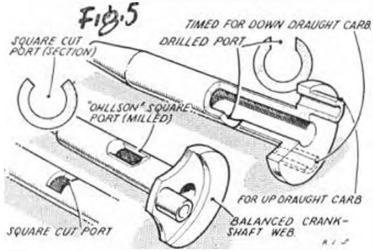
The choice of circular or square port entry in the crankshaft is arbitrary, especially as the end of the intake tube is almost invariably circular. Since a square port gives maximum area for a given width it is often preferred from the design point of view, when it can also be claimed that the type of port entry produced is more efficient in accelerating the gas mixture into the hollow portion of the crankshaft *Fig.* 5. About the only objection which can be raised is that the form of stress raiser produced by "stepping" or notching the shaft weakens it more than a circular drilled hole. But as

generous crankshaft diameters are common with this type of engine, overall strength is seldom a problem.

Induction port timing is now limited by the size of the "bite" the designer is prepared to take out of the crankshaft; also, to some extent, by the size of the induction tube. Average figures for high-speed engines are about 150 degrees total opening, positioned 116 degrees before and 34 degrees after top dead centre. These figures measured off Frog 2.49.

Rotary disc type of induction is virtually unlimited as regards timing at the expense of being a more critical proposition mechanically. It is quite obvious that to increase the opening it is only necessary to increase the length of the slot in the rotor disc, without any resulting weakening of stressed parts. In such cases extremes of timing may be encountered, such as the intake opening as much as 130 degrees before top dead centre, or with the piston only 17% of its stroke up from the bottom dead centre and closing 52 degrees after T.D.C. These figures measured off E.D. 2.46 Racer diesel. More significant from the development point of view is that port timing is readily modified during testing simply by working on the rotor disc with "cut and try" methods and without having to alter any major feature of the engine. Another advantage is the shorter gas passage with this form of induction.

On the debit side is the fact that the rotor disc *must* provide a good deal between the crankcase and the backplate (which generally means hand lapping the two surfaces); mounting is a major problem since it has to be driven at very high speed; and wear is inevitable. In the main, therefore, production-minded designers are more favourably inclined towards the crankshaft rotary valve.



"Flutter" Valves

An attractive alternative which has been exploited on model engines designs quite recently is the reed valve, which appears to have achieved for itself other designations of "Flutter", "Feather" or "Clack"valve—*Fig.* 6. This acts in essentially the same manner as the rotary disc valve, but without rotating parts; the opening and closing action being provided by a flap of spring material (or a spring-loaded diaphragm)—*Fig.* 7. Timing is controlled automatically by the differential pressure between crankcase and induction tube, tending to pull the flap open for mixture to be inducted all the time there is suction in the crankcase and closed when crankcase pressure is higher than intake tube pressure. If spring inertia is discounted this must provide ideal induction timing—a valve open for induction for the whole period there is suction in the crankcase and closing immediately the piston starts its downward travel and begins to build up blowback. In practice, with the right choice of spring material, this ideal timing does in fact appear to be approached closely.

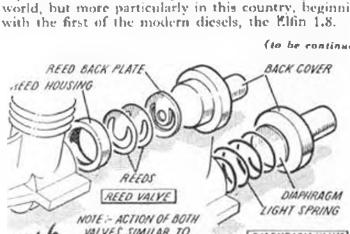
Limitations are the fatigue life of the spring material under operation stresses and the inertia of the system. The conventional reed valve consists of a flap of beryllium copper or phosphor-bronze of about .002-.004 in. thick (depending on size). How greatly this is stressed can only be guess estimated. But both beryllium copper and phosphor bronze are materials with continually diminishing strength subject to fatigue cycles and so eventually must fall under any vibratory load, however light. Since however, this should be measurable in millions and millions of cycles of reversal there is no reason why valve life should not be quite long enough for all practical purposes, with the correct initial choice of materials.

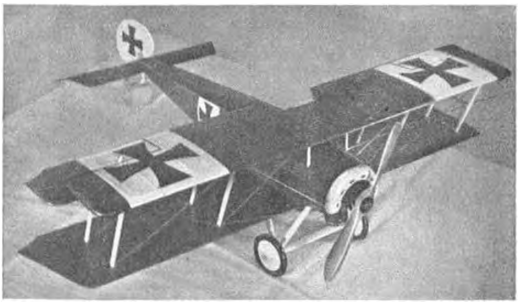
If the inertia of the valve is too great it will probably be reluctant to open at high speeds (the predominant pressure in a crankcase being positive), or it may tend to "float" in a partly-open position with a considerable amount of blowback on each revolution. It is still possible, however, that an engine could continue to run, and run quite well, under such conditions Largely, however, reed valve design is at present governed by "cut-and-try" methods—both the type employing a clamped reed unit and that employing a spring-loaded diaphragm. The latter would appear to be far less susceptible to fatigue effects since the spring is only lightly stressed, but its inertia is higher. Certainly the reed valve is a feature which cannot be discounted in future engine designs.

Pushing up the engine speeds beyond the limits reached by side port layouts also has the effect of making the other ports more critical. The faster the speed the less time there is for the mixture to transfer from crankcase to cylinder and for scavenging to be completed. The apparent solution is an increase in port areas all round to maintain a similar volume-time or flow rate figure. Hence the appearance of the so-called 360 degree porting where the ports are cut all the way round the cylinder wall, with only relatively narrow columns of material between to maintain the strength and rigidity of the cylinder.

Here one must pay tribute to the original Arden engine which appeared on the American market in 1946. The use of a steel cylinder with almost 360 degree exhaust porting cut in the walls (the top of the cylinder being carried by only three small columns of metal remaining) and similar 360 degree by-pass transfer formed by cutting out passages in the bore at the lower end of the cylinder, set a new standard which has been copied, modified and improved upon throughout the world, but more particularly in this country, beginning with the first of the modern diesels, the Elfin 1.8.

(to be continued)





A 30½ INCH SPAN ACCURATE SCALE CONTROL LINE STUNT MODEL OF A WORLD WAR I FIGHTER FOR 2.5-3.5 c.c.

FOKKER D. III.

By Frank W. Beatty

RARE, INDEED, is the model builder who hasn't built a World War I scale model; these veteran aircraft have always fascinated aeromodellers. More often than not, however, their performance does not match their pleasing appearance as the short noses and long tails typical of most World War I aircraft, make them very difficult to balance for control-line. Such a type is the Fokker D III — a real challenge to the designer.

At the outset, it was decided that this model's overall weight must be light enough so that sufficient ballast could be used in the nose without taxing the model's flying ability, and particularly that the tail end of the model be light as possible to minimize the amount of ballast required. The end product became an 18 ounce model which requires about 2½ ounces of ballast. Using an American K & B 19 with an 8 x 4 prop. she flies fairly fast with no perceptible pitching or yawing, and is capable of the less strenuous stunts. Alternative diesels range from the 2.5 E.D. Racer, Elfins, A.M. 25 etc., to the latest D/C Manxman.

Build the tailplane, elevators and rudder from lightweight ⅛ in. sheet balsa. Sand to shape, gouge out the elevators and cement the horn in place. Dope silk around the $\frac{5}{32}$ in. tubing, run the $\frac{1}{16}$ s.w.g. wire axle through and crimp the end tubes to retain it in place.

Make up the fuselage sides, using the plywood side rails, tail gussets and ¼ in. square balsa strips. Cement bulkheads F.3 and F.5 between the two sides. When dry add the motor mounts and the crosspieces aft of station 4. Bend up the 16 s.w.g. wire landing gear struts and sew them to the bulkheads. Bend and solder the 16 s.w.g. wire spreader bar in place at the axles. After the bellcrank plate, pushrod guide and tailplane assembly are cemented in place, the entire bellcrank assembly can be installed. The fuel tank should be installed just aft of F.3 bulkhead beneath the motor mounts. Formers 4, 5a and 7, the gun trough and plywood cabin struts and lower wing joiner can now be added.

Apply the various sheet coverings to the top, sides and bottom of the fuselage. Add the hollow cowling block with nose formers and fair in the landing gear.

Sew the 16 s.w.g. wire tailskid to plywood bulkhead No. 10 and cement the bulkhead in place. Insert the upright skid strut into the drilled hole in the tailplane. Bind and solder the skid assembly.

Install the rudder. The entire assembly can be silk (or tissue) covered, finished with dope and set aside until final assembly.

As the wing panels are of simple conventional construction little need be said of them. Build up the frames, cover with silk and finish with dope.

When the interplane struts have been made and painted, we can assemble the model. Slide the lower wing panels over the joiner and cement the ends against the fuselage side rails. Cement the interplane struts into the lower wing strut sockets. Before they set, cement the top wing into place. Double check for alignment before allowing the assembly to dry.

The rigging is bent, so that a ¼ in. length of each end may be cemented into $\frac{1}{16}$ in. aluminium tubing, using the cut and try method. Remember that if the scale drag wires are installed, the cowling may not then be made removable. This will make the engine harder to remove for maintenance. That is a choice to make, appearance or accessibility.

The addition of the gun and wheels will complete the model. The model *must* balance on or forward of the C.G. shown on the drawings and the more forward of this point the better the plane will fly. Install lead ballast in the cowling above the motor mounts as needed.

FOKKER D III

DESIGNED BY
F. Beatty

4'9

ALL WOODS ARE BALSA UNLESS OTHERWISE STATED

COVER WINGS MODEL WITH LIGHTWEIGHT MODELSPAN OR SILK

R.M. 25 SHOWN

MODEL MUST BALANCE FORWARD OF ARROW

MATERIALS REQUIRED

SHEET BALSA 3" X 36"	MISCELLANEOUS
2 SHEETS OF 1/16"	BALSA BLOCK 7/8" x 3 1/2"
1 SHEET " 3/32"	12" OF 1/8" SQ HARDWOOD
1 " " 1/8"	6" x 6" OF 1/16" PLY
EXTRA BALSA 24" LONG	6" x 3" OF 1/16"
4 STRIPS OF 1/8" SQ	2 PIECES - 16 SWG PIANO WIRE
1 STRIP " 1/4" SQ	1 PIECE - 20 " "
2 STRIPS " 1/16" x 3/8"	2 PIECES - 22 " "
2 " 3/16" SQ	1 " - 12 " BRASS TUBE
	1 PIECE - 18 " "

MISSING DIAGRAM
1 ALL RIBS 22 S.W.G. PIANO WIRE

W.S. 4 OFF 1/16" PLY

1/16" PLY REINFORCEMENT EACH SIDE OF RIB

18 S.W.G. WIRE LINE GUIDE

BIND WITH THREAD

1/16" PLY STRUTS 4 OFF EACH

W.S. 4 OFF 1/16" PLY

1/16" SHEET TOP DECKING

1/16" SHEET FIN

STRINGER 1/8" SQ TAPERED TO 1/16" x 1/16"

20 S.W.G. WIRE PUSH ROD

1/16" SQ

FLY TONGUE

POSITION OF PLYWOOD GUIDE

2 1/16" PLY TAIL GUSSETS

16 S.W.G. WIRE SKID

1/16" SQ LONGERONS, CROSS PIECES

POSITION OF LOWER WING

1/16" SHEET SIDINGS

1/16" SHEET

BRASS TUBES FOR BRACING WIRE

3/16" DIA WHEEL SEE FRONT VIEW

CABANE STRUTS

1/16" PLY 2 OFF EACH

SIDE RAILS

CR

W.S. 2 OFF 1/16" PLY

W.S. 2 OFF 1/16" SHEET

W.S. 44 OFF 1/16" SHEET
S. 2 OFF 1/16" SHEET

W.S. 2 OFF 1/16" PLY
1/16" SHEET

1/16" SHEET GUN TROUGH

3/16" SHEET COVERING FROM F9 TO F11

BELLCRANK

3/16" SHEET BOTTOM

TAPERED STRINGER

SILK PATCHES

16 S.W.G. BRASS TUBES

16 S.W.G. WIRE WING PIN

3/16" SQ H.W. BEARERS

1/16" PLY BELLCRANK PLATES

3/16" x 1/16" PLY LOWER WING JOINER 5 LINS

BRASS TUBES FOR RIGGING WIRES

1/16" PLY REINFORCEMENT

CORLINE FROM BLOCK OR 1/8" x 1/2" PLANKING

20 S.W.G. LEADOUTS

1/16" PLY

1/16" PLY

1/16" SHEET

PUSHROD GUIDE

EXTD. DOWN TO F10

1/2" OFFSET

3/32" SHEET COVERING

16 S.W.G. WIRE JOINER MOUNTED INTO ELEVATORS

SEW TO F5

1/16" SHEET TAILPLANE & ELEVATORS.

F5 1/16" PLY

CARD GUIDES

SPREADER BOOMS & SKIDS GLUED TO FRONT W.S. LEG

16 S.W.G. WIRE STREAMER FIXED WITH 1/16" S.W.

16 S.W.G. WIRE RUSH

1/16" SQ TIPS

1/16" PLY

TRUE LENGTH OF FRONT U/C LEGS

1/16" SHEET

F7A 1/16" SHEET

1/16" SQ

POSITION OF JOINER

SEW TO F5

TRUE LENGTH OF REAR U/C LEGS

1/16" SHEET GUSSETS

LOWER WING HALVES

UPPER WING

1/16" SHEET W.S.

3/16" SHEET

1/16" SHEET GUSSET

SECTION

1/16" PLY ALLERON HORN

BRASS TUBES

1/16" SHEET

PUBLISHED AEROMODELLER MARCH 1956

An early Power Modeller

Right. Professor Langley at the age of 63 when he wrote the article we quote below. Bottom of page is a Science Museum model of his 1903 "Aerodrome"

SAMUEL PIERPONT LANGLEY, like many of the early pioneers, used aero-models as a basis for his experiments, and was, in fact, the first power modeller to make a flight of any consequence, this in 1896 when he proved with a successful flight of two-thirds of a mile that man-carrying flight in a heavier-than-air machine was a distinct possibility.

The true measure of his genius can only be assessed when it is realised that not only did he produce designs and constructional details for the aircraft, but developed what was then a completely new concept in regard to the theory of flight.

The story behind this remarkable achievement is best described in the words of Langley himself, written in an article in the Strand Magazine of 1897, but before passing on to the account by Langley, let us briefly sketch the historical background of this remarkable man. Born in Boston, U.S.A. in 1834, he was formerly a civil engineer, abandoning this career for astronomy, becoming a Professor of Astronomy at Western University, Pennsylvania in 1897. Twenty years later he was chosen Secretary of the Smithsonian Institute in Washington, and aeromodellers fortunate enough to visit that city should note that one of his models can be seen at the Institute, this particular version powered with a 1 h.p. petrol engine.

In determining the basic principles of flight Langley set up a "whirling table" with a revolving arm 100 feet long, driven by a steam engine. After three years of experiments he established, amongst other things, that a flat plate weighing 200 lbs. could be sustained in the air for the expenditure of only 1 h.p.

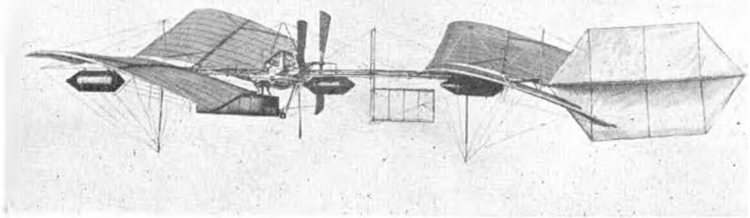
Next came the problem of design, and the professor wrote as follows:—

"At first it seems as though Nature must know best, and that since her flying models, birds, are exclusively employing wings, this is the thing for us, but perhaps this is not the case. If we had imitated the horse or ox, and made the machine which draws our trains walk on legs, we should undoubtedly never have done so well as the locomotive rolling on wheels."

There is a passing reference to Penaud, a Frenchman, who, 20 years before, had made a "toy" consisting of a wing surface, tail surface and a propeller of cork and feathers, driven by twisted strands of rubber. At that time, so far as the professor knew "no machine had ever flown for more than 10 seconds, unless it were Penauds' toy".

A first model fitted with propellers and a steam engine, was designed and laboured on for many a month. The weight was ever increasing beyond the estimate until the whole weighed more than 40 pounds. "It was clear that, whatever pains it had cost, it must be abandoned . . . but having learned from it the formidable difficulty of making such a thing light enough, another was constructed . . ."

There follows an account of successive machines powered by various means—compressed air, carbonic acid gas, and steam. Each one was lighter than the last. "But though each was an improvement on its predecessor, it seemed to become more and more doubtful whether it could ever be made sufficiently light, and whether the desired end could be reached at all . . . The chief obstacle was not the engines, but the boiler" and also sufficient structural strength in wings and frame.



"Crown Copyright— from a model in the Science Museum South Kensington"

Such were the difficulties after 2 years of effort. "... and it seemed at this stage again as if it must, after all, be given up as a hopeless task, for somehow the thing had to be stronger and lighter yet ... Everything in the work has got to be so light as to be on the edge of breaking down and disaster and when the breakdown comes, all we can do is to find what is the weakest part and make that part stronger, and in this way work went on, week by week and month by month, constantly altering the form of construction so as to strengthen the weakest parts, until, to abridge a story which extended over years, it was finally brought nearly to the shape it is now ..

The time had come for a trial flight.

"It became clear without much thought that, since the machine was at first unprovided with any means to save it from breakage on striking against the ground, it would be well, in the initial stage of the experiment, not to have it light on the ground at all, but on the water".

"... A great many places were examined along the shores of the Potomac, and on its high bluffs."

None were suitable, partly for their publicity, also since the machine must "begin to fly in the face of the wind ... it was necessary to send it from something that could be turned in any direction".

Accordingly a scow was chosen and a platform, 20 feet above the water, was built upon it. A suitable site was found 30 miles down river from Washington and the boat anchored there in November 1893.

Then followed a succession of abortive visits to the site, each one requiring a trip of 60 miles.

Always the wind was too strong. Even the lightest breeze was enough to upset a launch, the machine being "the most unmanageable and helpless of creatures until in its proper element". We must remember too the tedious complication of raising steam on each occasion to supply the motive power.

"During most of the year of 1894 there was the same record of defeat ... Finally in October '94, an entirely new launching apparatus was completed"

This held the model firmly and was capable of launching in a moderate breeze. Fresh problems then arose.

"This new launching-piece did its work in this respect effectively, and subsequent disaster was, at any rate, not due to it. But a new series of failures took place, which could not be attributed to any defect of the launching apparatus, but to a cause which was at first obscure, for sometimes the 'aerodrome', when successfully launched, would dash down forward and down into the water, and sometimes (under apparently identical conditions) would sweep almost vertically upward in the air and fall back, thus behaving in entirely opposite ways, although the circumstances of flight seemed to be the same."

The cause was eventually traced to flexing of the wings during flight. The professor continues:—

"Has the reader enough of this tale of disaster? If so, he may well be spared the account of what went on in the same way. Launch after launch was successively made. Wings were finally, and after infinite patience and labour, made at once light and strong enough to do the work." Another year had passed.

"And now in the long struggle the way had been fought up to the face of the final difficulty.

"It is enough to look up at the gulls or buzzards, soaring overhead, and to watch the incessant rocking and balancing which accompanies their gliding motion, to apprehend that they find something more than mere strength of wing necessary, and that the machine would have need of something more than mechanical power, though what this something was, was not clear."

A study of the hawk in flight "suggests an acrobat on a tight-rope, only that the bird uses its widely outstretched wings in place of the pole ... There is something then, which is difficult even for the bird in this act of balancing."

After many experiments the final model was evolved and, for those days, was of remarkably advanced design.

Our illustration shows dihedral and camber and also the "rudder for horizontal and vertical steering". The wing span was 12 to 13 feet and the overall length was 16 feet. Weight was under 30 pounds. Boiler and engine made up one quarter of the total weight and developed 1 to 1½ horse power. Duration under power was two minutes.

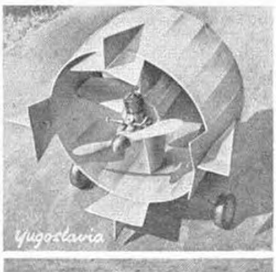
At last, after 8 years of trying, the gallant professor's labours were to be rewarded.

"On the 6th of May 1896 I had journeyed, perhaps for the twentieth time, to the distant river station, and recommenced the weary routine of another launch with very moderate expectation indeed, and when on that, to me, memorable afternoon the signal was given and the 'aerodrome' sprang into the air, I watched it from the shore, with hardly a hope that the long series of accidents had come to a close. And yet it had, and for the first time the 'aerodrome' swept continuously through the air like a living thing, and as second after second passed on the face of the stop-watch, until a minute had gone by, and it still flew on, and as I heard the cheering of the few spectators I felt that something had been accomplished at last, for never in any part of the world or in any period, had any machine of man's construction sustained itself in the air before for even half of this brief time. Still the 'aerodrome' went on in a rising course until, at the end of a minute and a half (for which time only it was provided with fuel and water), it had accomplished a little over half a mile, and now it settled rather than fell into the river with a gentle descent. It was immediately taken out and flown again with equal success, nor was there anything to indicate that it might not have flown indefinitely except for the limit put upon it ... 'It was like a miracle', said one who saw it."

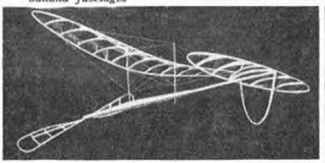
It is interesting to note that Alexander Graham Bell, inventor of the telephone, was an enthusiastic witness on this occasion.

Finally, we come to professor Langley's conclusions:—

Continued on Page 160



Top: Escadrille des Cedres, Flers. Pere Amiard's 1956 aeromodelling students, with the Father himself in centre. Coleoptere above has Aero 250 (see text). Right: S. Onomura won a beauty event with Enya 63-powered Helldiver at Matuya, Japan. Below: O. Ginstroms's and Niemela's indoor models at Helsinki. Left: Dr. Sultan's latest canard has a Webra diesel and a nice line in banana fuselages



NEW PLYMOUTH, in North Island **New Zealand,** was the scene of the New Year Nationals and first brief report tells us that they had fine weather with but one windy day. The International teams are selected at the N.Z. Nats, and for 1956 the Wakefield representatives will be A. Leong, B. Roots, R. Wong and A. McAuley, while for A/2 Glider the four are E. Terrill, D. Howlett, D. Watson and P. Wheeler. Hope they send their models over to Sweden and Italy; they deserve a break in the results after all their valiant efforts in past events. Champion of Champions at the Nats was Laurie Ackroyd, with John Sheppard close behind, and the Auckland Club took the honours as Club Champions. More details later —when the surface mails reach us, and, we hope, news of the Australian Nats as well.

A nice letter from young Nossum Dekalo of Tel-Aviv, **Israel,** tells how pleased he is with his A.1.S. *Y-Bar* which he fitted with an E.D. 1.46 diesel and flew to win the annual Israeli Aero Club contest. He's not the only one to appreciate the niceties of this simple contest design by Tony Brooks, for we know of a few others that have had similar success in Club events.

The annual Indoor Rally of **Finland** is held on New Year's Day at the Helsinki Exhibition Hall, which is rarely empty except for this particular day, when presumably the populace is recovering from the activities of the eve before. The hall is 156 ft. high and the classes are for Microfilm, Scale or Kit models. Scandinavian classification for indoor designs is B-1 (just as we have A-1 and A-2 gliders, or C-1 rubber and D-1 power models) and the winner of B-1 Microfilm types was S. Niemela with a 7 m. 40.6 sec. flight. After the contest he established a new Finnish record with 9 m. 10 sec. Scale was won by R. Hyvarinen at 1 m. 56 sec., which is no mean effort for a tissue-covered indoor job, and in the Kit section T. Leino topped the Juniors with 1 m. 1 sec. and L. Liljamo was leading Senior with 1 m. 17 sec. If only someone would find a suitable hall in London we might be able to enjoy similar contests in England!

The Coleoptere is a flying machine of the future that is arousing more than ordinary interest in France and America among the full-size fraternity. Using jets on the real thing, the Coleoptere could make a vertical take off, change attitude into level flight at supersonic speeds and back down again for a landing. This has

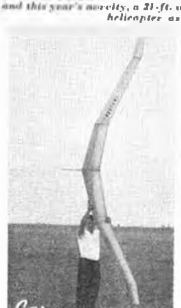
been demonstrated with wind tunnel models and some idea of what the circular wing looks like can be gained from the pictures opposite. Milan Maringer of **Yugoslavia** built this one for control-line fun, with an Aero 250 diesel. Milan was in the Yugoslav A/2 team that went to Denmark in 1954, and is a student at Belgrade University. He fitted a normal u/c to the Coleoptere for take-off and found a tendency for the strange craft to roll in. At the moment the engine is under repair, but anti-torque trim has been incorporated and we hope to hear of success soon. This could be a fine application for a contra-prop unit almost a flying ducted fan without wings in fact!

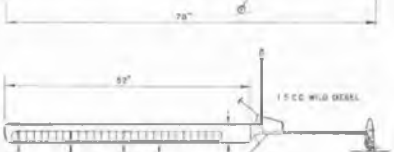
Interest in the A-1 glider class is shown in **Czechoslovakia** by publication of three typical designs from Poland, Holland and Great Britain, including, we note with pleasure, our own A.P.S. *Golden Wings* design. We also note a report on the 1955 **U.S.S.R.** Nationals, the first we have heard of, and certainly one which called for travelling over vast distances. For example, the A/2 Glider winner (all models were flown to the F.A.I. classes) was V. Cebotajev with a total of 10 : 47 and he came from Kirgiz. If you care to look that up in the atlas, you'll find it on the borders of Afghanistan and China (Yak hair tow-line ? ?). Wakefield was won with a 15-minute maximum total by N. Kolpakov and another Moscow local boy, V. Subbotin, was first in Power with 13 : 22. Other competitors came from all parts of the U.S.S.R., ranging from Azerbaidzhan on the Persian border of the Caspian Sea, to Uzbek on the shores of Aral Sea, and the Ukraine.

In **France** and the **U.S.A.** the passage of administration in the hobby is not quite as smooth as it might be. Maurice Bayet threw open a couple of pages to air argument on French matters in his *Modele Reduit d'Avion*, quoting critical foreign press reports on that World C/L Championship meeting in Paris last year—including our own words at the head of the list. Italian and Belgian comment was apparently less polite, and the French method of publishing both the official view and that of keen individualist Jacques Morisset will doubtless satisfy honour all round. It seems that everyone is *for* modelling: but the methods of approach vary in temperament. The American situation is different in that the A.M.A. is still lacking an Executive Director—a situation that has persisted for about a year, and the A.M.A. election for a new president has stirred up a big query as to who actually decided that the U.S. Nationals should be held at Dallas this year! In an advert. in *Flypaper*, canvassing for Presidential votes for Frank Bushey, we see the distribution of A.M.A. membership over the U.S.A. Among others, the State of New York has 1,011 members, Missouri only 50, California 959, and Wyoming 10. Allowing for terrain, it would seem that free-lance fliers must outnumber the A.M.A. members by a wide margin.

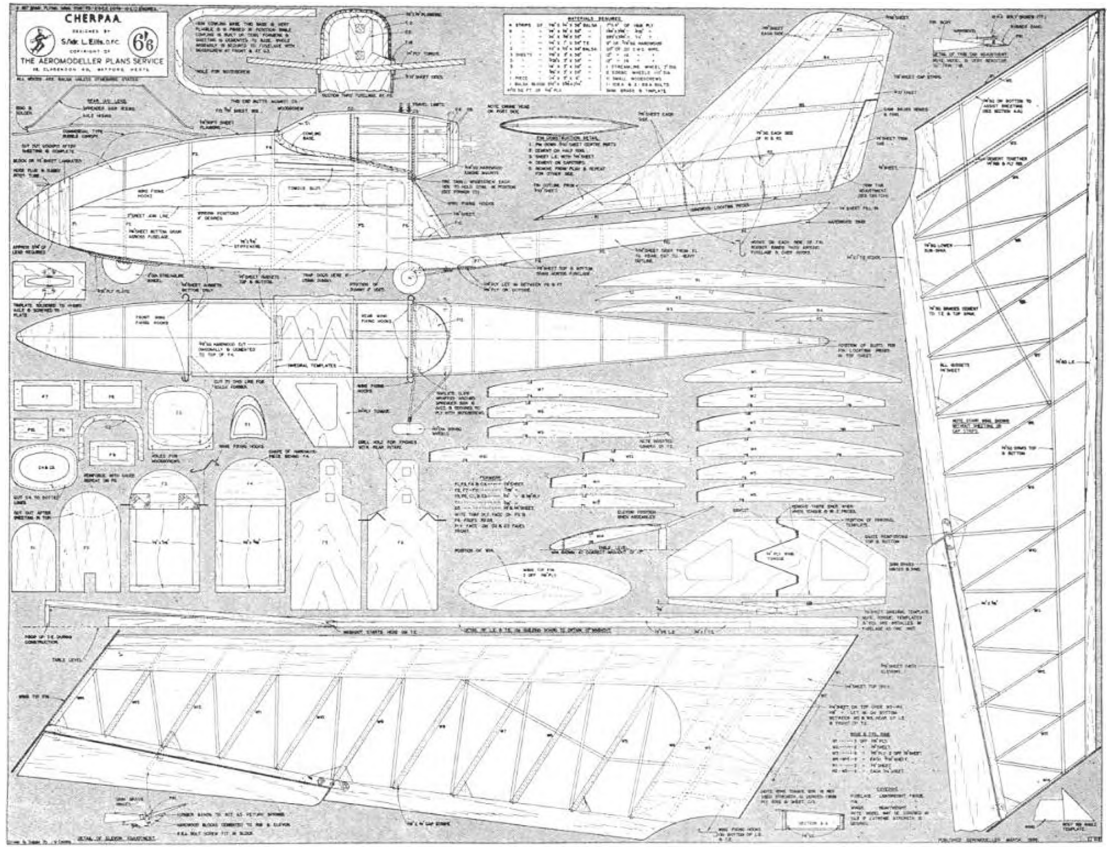
A fine opportunity to exchange correspondence with one livewire American club is offered by the 48 members of Capitol Aeromeers, Box 783, Austin, Texas. Eight of them fly F/F, the rest are keen combat and stunt men—so why not write and get in touch with aeromodelling over there?

Above: U.S. modellers at Wiesbaden, Germany, and neat, fully-aerobatic Fokker D.VII. Below: Left—Herr Zeilling of Stuttgart and this year's novelty, a 21-ft. wing; right—George Horvath and helicopter as drawn below





Hungarian Helicopters at right are based on Charles McCutchen's article published in July, 1951, issue. One at far right (photo above) holds record of 7 minutes 18 seconds, flying 4,280 ft. and reaching 928ft. altitude—try one for size



FULL-SIZE COPIES OF THIS 1/6 SCALE REPRODUCTION OF THE A.P.S. DRAWING CAN BE OBTAINED. PRICE 6·6 POST FREE FROM THE *AEROMODELLER* PLANS SERVICE

Build yourself this unorthodox all-rounder that will take any motor from the Mills .75 to a hot stuff Webra 2.5cc.

CHERPAA

By S/Ldr. Laurie Ellis, A.F.C.

NO CLAIM IS MADE for originality in design in "Cherpaa". The shape has been used before. A smaller version was built in Egypt in 1950 and its flying ability prompted thoughts for an improved version. With the 1955 British Nationals coming up it was felt that something a bit different might be tried for the PAA load event—however it was realised that its 654 square inches of area and 32.5 oz. unloaded weight would not put it in the winning class—still not everyone can win but a lot of us get a kick out of trying.

"Cherpaa" gets its name from its resemblance to the Short Sherpa. It has been flown with Mills 0.75, Mills 1.3, Oliver Tiger Cub and Webra Mach 1. With the Mills 0.75 its performance is rather slow and underpowered but it does fly, however. On the other extreme, with the Webra Mach 1 it is in the "hot" class and one will do well to go easy on the trim. The ideal for general all round fun is with a good Mills 1.3 using a pusher 8 x 4 prop, or one can use a standard 8 x 4 put on backwards and rotating in the opposite to normal direction. The model is easy to build and the plans are almost self-explanatory. Anyone who has built a power model before should have no difficulty. Construction time is around 45 to 50 hours.

Trimming

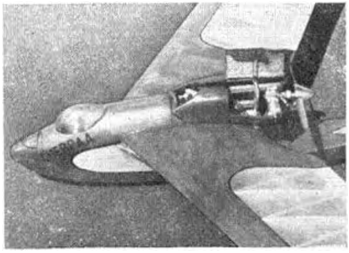
Trim in fairly calm air for the first time. By means of vernier adjustment screws move elevons up approximately ¼ in. Make sure that C.G. is as shown on plan. Hold model overhead and hand launch into long grass in a slightly nose down attitude. The model needs a reasonable push but don't overdo it. If the model shows a tendency to stall, lower the elevons a bit or if glide is too steep raise elevons. Remember that the model will turn toward the higher elevon. Keep adjusting until a long flat glide is obtained.

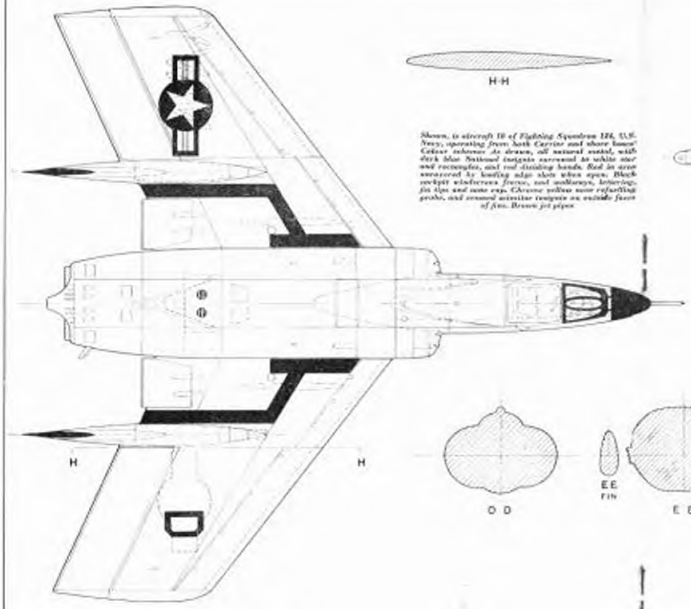
Using a pusher prop., rotation anti-clockwise, the model will turn to the right under power. Assuming that this type of prop. is being used, first power flights should be tried on low power and slight left rudder. This will give a climbing right hand power flight and left hand glide. Be very careful with rudder adjustment as the model answers it quickly.

If an ordinary prop. is used back to front and rotated clockwise, as can be done on the Mills, then the reverse trim to the above will be required. One can go on indefinitely on various trim settings so the best thing to do is use the above settings as a guide and go on from there. The model, with no load and high power, does not like straight ahead flight—it must be flown in a turn to avoid stalling flight. A load (16 ozs. PAA) cures this however.

With Oliver Tiger Cub 1.5 c.c. power the model will carry a 16 oz. load with no difficulty at all. If anyone is contemplating the installation of R/C gear they can rest assured that it will carry the weight with ease.

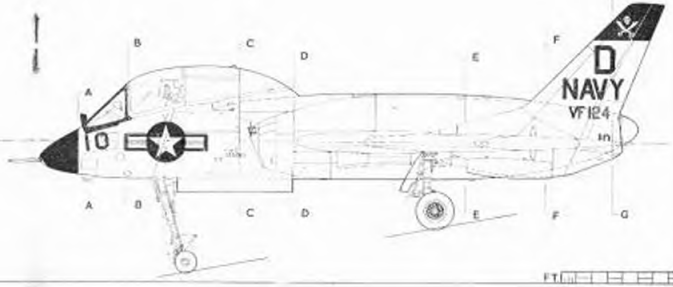
Access to the engine, in this case a Tiger Cub for P.A.A use carrying an 8-ounce dummy and 8 ounces of ballast, is easy via the hinged cowling. Cherpaa is probably the most universal design yet published, serving Tailless, P.A.A, Precision, Duration or R/C conversion. Someone might even fit sponsons and float it!





Shown, is aircraft 10 of Fighting Squadron 124, U.S. Navy, operating from both Carrier and shore bases. Colour schemes as drawn, all natural metal, with dark blue National insignia surround in white star and rectangles, and red dividing bands. Red in area surrounded by landing edge slots when open. Black cockpit windscreen frame, and walkways, lettering, fin tips and nose cap. Chrome yellow nose refuelling probe, and ground scanner ramparts on outside faces of fins. Brown jet pipes

1/72nd scale reprints of the "L" type plan 1/48th scale "B" type dye-line prints are available price 1/- and 1/6d. respectively from AEROMODELLER PLANS SERVICE.



CHANCE VOUGHT F7U-3 "CUTLASS"

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AEROPLANES IN OUTLINE
NUMBER 43

CHANCE VOUGHT CUTLASS

BY J. R. ENOCH

WHILST THE HIGHLY successful F4U Corsair was still in quantity production the Chance Vought Co. began design study in 1946 for a twin jet interceptor fighter for Carrier-borne operation with the U.S. Navy. To a large extent the design was based on information which had been formulated by the German Arado Company towards the end of 1945, and represented an unconventional approach to the problems involved.

Designated XF7U-1 Cutlass, the prototype was first flown on 29th September, 1948, and within two months the initial flight trials were successfully completed. A small production batch was ordered, the first of these production aircraft making its maiden flight on 1st March, 1950. The F7U-1 entered service in December, 1951, and the aircraft were used for evaluation, carrier trials and training, during which period it became the first swept wing jet aircraft to operate from the deck of an Aircraft Carrier.

Generally similar to the prototype, the production F7U-1, fourteen of which were completed, was powered by two Westinghouse J34-WE-32 3,000 lb. thrust turbo-jets, and was the first U.S. combat aircraft to be conceived with thrust augmenting afterburners as a feature of the basic design. Four 20 mm. cannon situated two either side of the retracted nosewheel unit formed the armament of the type. An increase in fin area over that of the prototype was made on these machines.

A small number of the improved F7U-2, to be powered with J34-WE-42 jet units, was scheduled for construction, but the order was dropped in favour of the F7U-3 variant, produced as a result of very extensive structural and aerodynamic re-design. The F7U-3 first flew from Hensley Field, Dallas, on 20th Dec., 1951.

The low aspect ratio wing of symmetrical section which has 35 degrees sweepback at quarter chord, is fitted with full span leading edge slats, and air brakes, mounted on extension hinges at their leading edge, which open above, and below the wing inboard of the fins. Large area single piece combined aileron and elevators form the outer panel trailing edge. Known as ailavators—these surfaces are operated by means of two completely independent hydraulic control systems, connected in tandem. There is no direct mechanical link between the pilot's control column and ailavator surface, though simulated feel is incorporated. This manner of control system, pioneered by Chance Vought for high performance military aircraft, provides the pilot with a maximum of safety and effectiveness in the event of severe structural damage being sustained in combat.

The fuselage of the Cutlass is dominated by the very large, backward sliding cockpit canopy which affords the pilot exceptionally good visibility, an essential feature for carrier operations. The pilot is provided with an ejector seat in the air-conditioned, pressurised cockpit. Due to delays with the Westinghouse J46 initially intended to power the F7U-3, the first fifteen of the type were temporarily supplied with the 5,000-lb. Allison J35-A21A turbo jet. As the J46-WE-8 axial turbo jet, rated at 4,800 lb. static thrust (6,100 lb. with afterburner) became available, it was standardised for later production aircraft. For servicing, the power units are removed from the rear of the fuselage rather than the underside, and to enhance accessibility for maintenance, many detachable panels (over 100 more than on the F7U-1) are located to expose all the essential points of the many ancillary systems.

Main armament of the Cutlass is 4 x 20 mm. cannon which are mounted in pairs in the upper lip of the air intake fairings. Supplementing these guns, an easily detachable rocket pack can be fitted under the centre fuselage and also for some missions under each wing. This pack contains 16 2.75 in. Mighty Mouse rockets in separate repeater tubes behind a single forward door which, when opened, operates the firing switch. A variety of underwing stores in several various combinations can be carried. Normal loaded weight is 20,000 lb. to a maximum a.u.w. of 23,300 lb. Empty weight is approximately 13,000 lb.

Maximum level speed of the Cutlass is more than 650 m.p.h., supersonic speed in a shallow dive being possible with no adverse effect on handling qualities. The low speed characteristics down to the stall are claimed to be particularly good. With the afterburners operating the rate of climb is more than 13,000 ft./min. to the service ceiling at over 45,000 ft.

Developments of the F7U-3 Cutlass are the F7U-3M equipped to carry either "Sparrow" or "Sidewinder" guided missiles on external launchers.

An unarmed photo reconnaissance version, the F7U-3P, has a nose lengthened by 25 in. to carry five various cameras, aimed through ports forward, downwards and obliquely. For night operation up to 104 flash flares are carried in the gun bay.

Top left: 1200° flames illuminate Moffet field smog as all-silver No. 71 of VC-3 Sqdn. runs afterburners. Right: -3M in gull grey and white has missile racks. Here: Seven weird birds await delivery to a Navy Sqdn.

ARMCHAIR AERONAUTICS

GOOD READING FOR YOUR BOOKSHELF

THE SKY MY KINGDOM *by* HANNA REITSCH, *illustrated* (The Bodley Head), 12s. 6d.

One can glean many more facts and figures per paragraph from this 210 page autobiography of the fabulous German aviatrix than from many another flying story that has come out of Germany since the war years.

From her early experience in glider training under the skilled tutorship of Wolf Hirth, to the cable cutting demonstration before Ernst Udet in a Dornier 17; the first flight tests of the Me 163; piloting the V1 "Reichenberg" Guided Missile; and the fascinating account of landing among the streets of beleagured Berlin in a Fieseler Storch before the last hours of the Fuhrerbunker, one cannot help but remain absorbed in this story of a like not yet completed.

Hanna Reitsch has a rare appreciation for the joy of flight and if apparently naive in regard to less pleasant aspects of the recent war, does at least demonstrate her extraordinary abilities in airmanship in this volume.

THE AIRCRAFT OF THE WORLD *by* W. GREEN and G. POLLINGER, *fully illustrated* (Macdonald and Co.), 35s.

We have been asked by one enthusiastic owner of the first edition of this title whether it would be worth his while buying the latest edition, and our immediate reply was an emphatic yes, for this is a book essential to any self-respecting Aerophile. The price is up by 10s., there are 52 more pages, the contents are completely re-sorted into a sensible alphabetical order and the number of new additions are enough to whet any scale modeller's appetite. The Tachikawa R-HM (Mignet Japanese Flea), Aero-Flight Streak, Fletcher Utility, Sipa Coccinelle, Antanov AN-2 and Alaparma Baldo are but a half dozen of many types that call for enlargement from silhouette into flying models. The astute may still find omissions; but for our money there's enough in these pages to make it a number-one reference source in the "AERO-MODELLER" Query department.

A PICTURE HISTORY OF FLIGHT *by* JOHN W. R. TAYLOR, *fully illustrated* (Hulton Press), 25s.

The title is self-explanatory, the reputation of the *Picture Post* photographic library well known, and the authenticity of J. W. R. Taylor's writings guarantees that this work is worthy of our bookshelves. It is fascinating to look back on early experiments (among them the Langley tandem wing described on page 134) and to see how adventurous were the first of the aviators. Pegoud who flew outside loops in his Bleriot in 1913, Santos Dumont, whose famous *Demoiselle* flew at 60 m.p.h. on only 25 h.p. and weighed 242 lb. ready to fly, and the fantastic flying machines created by experimenters of 1904-1908. Six hundred and fifty excellent photos take us from King Bladud to the Viking Rocket, and provide a history of flight that all enthusiasts will appreciate.

JOHNNY KINSMAN *by* JOHN WATSON (Cassel and Co.), 12s. 6d.

Good fiction this, and precious near to truth for any of the youthful volunteer pilots who found their way into Bomber Command during the war. Kinsman is a Halifax pilot and we follow his fortunes from his first job through to his tour of "ops". The background is accurate and the human element most realistic for those unsettled wartime years. Any ex-R.A.F. man will appreciate this splendid recount of Service life, and it makes a fine companion plot to Elleston Trevor's *Squadron Airborne* (Heinemann) which dealt with Fighter Command.

BITTER MONSOON *by* OLIVER MOXON (Robert Hale Ltd.), 15s.

This is a very personal story of a fighter pilot, Stefan James, who wrote his autobiography whilst encamped in the Imphal Valley during the Burma campaign in 1944. Oliver Moxon, the author, discovered Stefan's writings whilst sorting "with infinite sadness" through his friend's belongings "after his tired old Hurricane carried him to an early grave against the jungled side of the Naga range". With the permission of Stefan's parents he presents his friend's jottings "unaltered save for the merest attempt at editing".

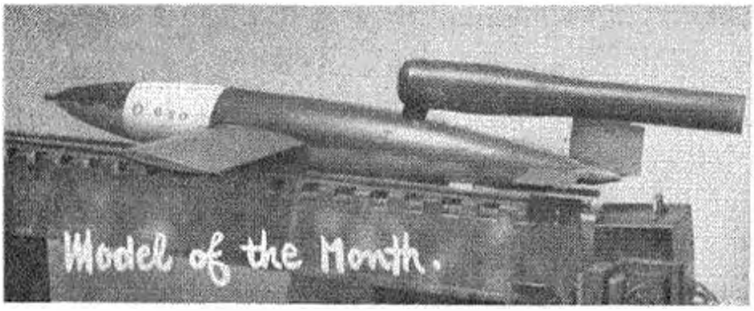
The first part of the book deals with the life of Stefan James before he arrived in Burma. It can be said without exaggeration that his career was interesting and varied to an unusual degree, so much so that we who have led more mundane existences cannot help but feel a touch of envy. Written with complete realism, and without inhibition, by a man who appreciated not only flying but the finer points of life, it is the most vivid personal story of the war we have read.

BOAT MODELLING *by* VIC SMEED (Model Aeronautical Press Ltd.), 5s.

Vic Smeed needs no introduction to aeromodellers, being "one of the fold". Hailing from a seaboard town, Herne Bay, it is not surprising he is an expert on boats. Even his aeromodelling had a nautical flavour as readers will remember from his series on waterplanes.

Assistant Editor of our companion magazine, "MODEL MAKER", and best selling designer in the model boat field, he has produced a book of infinite value to all those who want the complete "gen" on boats of all kinds. Power boats, Hydroplanes, Yachts, etc., are all covered fully from design through to the various methods of construction. For those who wish to try their hand afloat for the first time it is a "must", and the nautical experts will find it invaluable for reference.

MODEL NEWS

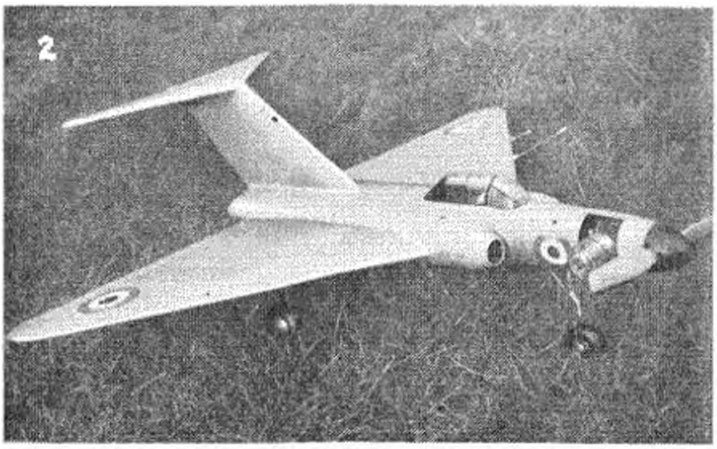


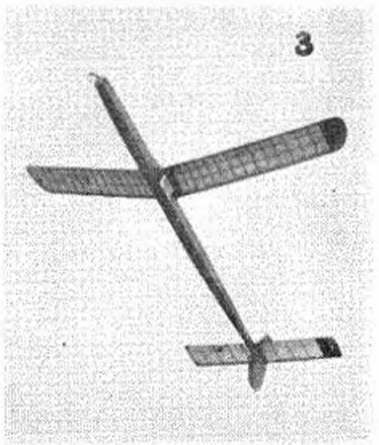
REMINDING US OF less happy occasions is our choice of model of the month, built by Peter Russell of Worksop. It is an exact reproduction to 1/5th full size of the German V1 flying bomb, at present using a Dynajet and dolly for take-off. The speed is about 90 m.p.h. but this may be increased when a large-scale pulse jet is completed and a ramp used for launching. At the moment the Dynajet shows disinclination to continue pulsing when subjected to catapult launching. Of the total weight of 7½ lbs. no less than 2 lbs. is ballast in the nose, which we trust is inert and not explosive.

Picture **1** does not appear to be at all unusual as it shows M. J. Dumble of Surbiton launching his Veron Tru-Flite Bebe Jodel at Epsom Downs; but this particular kit has been converted to take an Allbon Bambi diesel, and as we see in the photograph it flies beautifully, outdoors and indoors, with motor runs of up to seven minutes for round-the-pole flying. We wonder how many of our readers would have thought ten years ago that it would ever be possible to have a *power* model capable of flying inside a small hall on a line, or out of doors in free flight, having a wing span of only 18 in.? The Veron kits are, of course, not the only ones to be Bambi-ed, other popular lines being the Keilkraft series, notably the latest kits for the 1914-1918 fighters, and the Skylcada 16 in. flying scale range. Care should be taken to select a type with ample dihedral, and in that respect Mr. Dumble has chosen an ideal subject in the Veron Bebe Jodel.

There appears to be a swing toward flying scale and semi-scale control-line models, if the number of pictures submitted to the Editor for inclusion in "Model News" is to be taken as an example of what is going on.

Picture **2** shows a control-line near-scale Gloster Javelin by A. E. Kemp of Sutton, Surrey. Mr. Kemp assures us that when in flight the almost invisible





propeller gives the model a most realistic air, its black spinner resembling the glass fibre radome on the full size. Action shot in picture 3 shows P. Giggle's latest Wakefield on its way up to a test flight. This Brighton flier was well in the running last year and seems to be getting in plenty of practice for the 1956 Eliminators. With the coming of the new rules our tame slide rule expert tells us that long fuselages like this will be a thing of the past as he does not expect motors to drop below the 14 strand mark and with about an 18 in. motor even a 9 in. nose will be considered rather long!

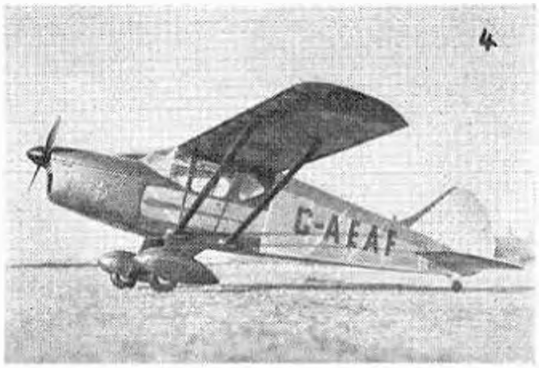
Always a firm favourite with the flying scale fans, the Foster Wickner Wicko seen in photograph 4 is a 48 in. version built for the Elfin 1.49 diesel by B. A. Smith of Eastbourne. We wonder if photographer J. Banks followed our advice in January "Model News" when he took this nice low angle shot. The model is finished in yellow and red, our only criticism being that, using coloured tissue, the model framework tends to stand out somewhat unrealistically.

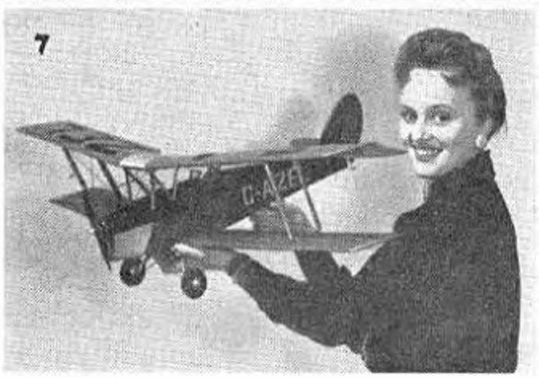
A solid now, and a very nice one, built to 1/48th scale by K. J. Morgan of Emsworth, which is complete with detailed interior, and electric light for internal illumination. The model took six weeks to construct and shows the Handley Page built Marathon (photograph 5) in latest R.A.F. markings with all silver surfaces and yellow Trainer/Communications identification bands across the wings and around the fuselage.

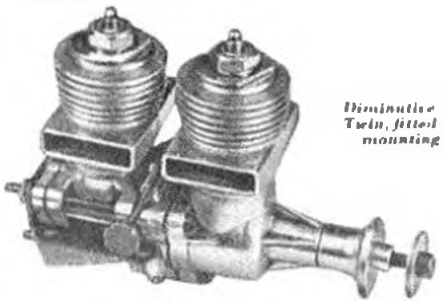
Astute readers who think we have tripped up in attributing the Marathon to Messrs. Handley Page will be interested to know that the Marathon was acquired in 1948 by Handley Page (Reading) Ltd., and 30 of the 39 machines made from the design originally developed by Miles Aircraft Ltd., are in service as navigational trainers and communications aircraft with the R.A.F. and known as the Marathon T11.

An exact side elevation photograph of the Hawker Hart made by Ian Thomas, as seen in picture 6, shows the slight diversion from scale in the nose, which accommodates a PB Amco 3.5. Built from the AEROMODELLER Plans Service drawing, the Hart is authentically finished in the dark blue and gold livery of the Hawker Company, with civilian registration and racing numbers as carried for the National Air Races when flown by Hawker test pilots in its single-seater form.

Mr. R. G. Grimes of Acton gets around—as anyone daring to read our contemporary magazine will have observed! In *this* photograph (7) showing his Mercury Tiger Moth complete with Mills .75 finished and covered, (taken at 1/10th second with lens aperture F8 and using three No. 1 photo floods) we see the charming blonde Miss Yvonne Reeves. Beyond that we have no more data as we are told "further information is heavily censored"; but taking our pick of the young ladies who appear to have attended Mr. Grimes' studio, we rather like our version. —For those not quite "in the know" see February "*Model Aircraft*".







Diminutive Sky Fury Twin, fitted with beam mounting bracket

Engine Analysis

THREE INTERESTING 2.5 c.c

K&B Allyn "SKY FURY",

AS AN OUTSTANDING example of production "model engineering" and for design ingenuity, we would rate this new American "twin" very highly. But performance-wise, frankly, we feel that it leaves much to be desired.

Apart from any considerations of novelty, or appearance, a model size twin must inevitably suffer from increased friction over a single cylinder engine of the same capacity. The fact that twin or multi-cylinder arrangements mean that piston speed can be reduced does not appear to offer benefits in model sizes and so the only other remaining advantage is that an alternative firing twin will be much better balanced, and should therefore produce less vibration—a feature particularly attractive for radio models.

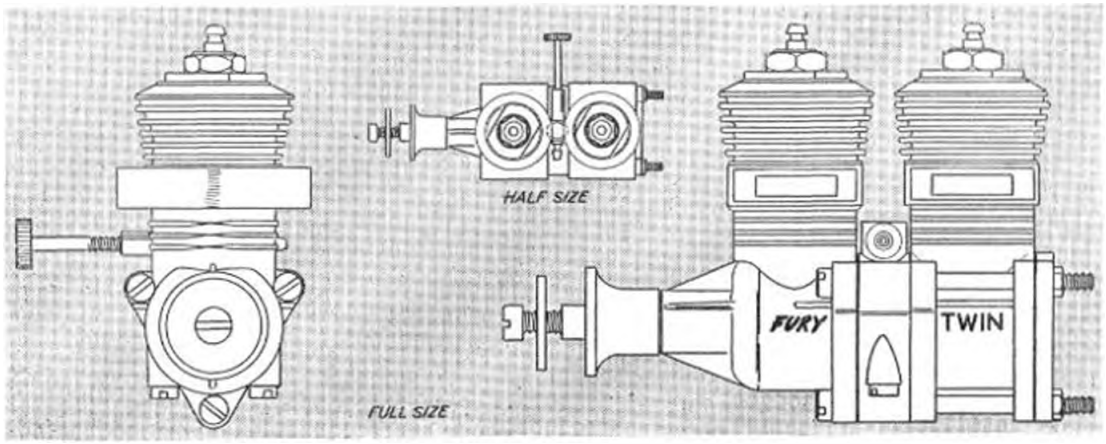
Strangely enough, however, the K & B Allyn "twin" apparently ignores the fact that although alternate-firing in-line cylinders nullify the normal "out of balance" of a single cylinder unit, a farther "fore and aft" or "rocking" vibration is set up by virtue of the arrangement of the impulse strokes, one behind the other. Designed for radial mounting, the considerable overhang tends to make this "fore and aft" unbalance quite appreciable and although alternative beam mounting is available, this mount merely takes the form of an attachment anchored to the normal radial mounting points. Hence, whichever way the motor is mounted, our experience was that it vibrated just as much as any normal single-cylinder engine.

Starting is something of an art. We are tempted to say that getting the engine started at first was a feat, because of the peculiar "feel" and lack of positive compression when flicking over; the difficulty of priming each cylinder equally (finger choking being quite useless); and its apparent reluctance to run at anything other than high speed on very small props. Americans would probably get on much better since they are more used to loose piston fits and glow-motor technique, but we frankly confess that it took us over half an hour to get the "twin" running for the first time. Once it was going, and only then, was it apparent from the noise that we were dealing with a 2.5 c.c. engine. Physically, it looks a much smaller unit.

With each cylinder having its own glow plug there are several ways of connecting up the battery. We found the simplest and most satisfactory solution to be working the plugs in series, connecting one lead of a 4 volt battery, (through long leads to drop the voltage) to one plug and the other to the other plug. Getting each cylinder really wet with fuel and flicking over fast then usually produced results, but not with the consistency we have come to expect with modern engines. In fact, to save time and temper, electric starting was used for most of the subsequent test runs.

No specific performance measurements were taken, except that with a 6 x 4 Frog nylon prop. r.p.m. with Mercury No. 7 fuel, r.p.m. was about 15,000—a figure one would normally expect to be exceeded by a good 1.5 c.c. diesel. It did not appear to be very happy on larger propellers, nor was the prop. driver and shaft screw adequate to cope with larger sizes without slipping Some inconsistent running was traced to the cylinder heads working loose which, after tightening down whilst still hot, gave no further trouble. The needle The needle valve control was reasonably flexible, but appeared best left slightly on the rich side (and practically wide open for starting).

On the "engineering" side, the design is full of interest. The sketch shows the method of coupling up the main units. The front crankshaft is virtually nothing more than a propeller shaft, driven by an extension of the main crankshaft front crankpin engaging in a slot.



The main crankshaft itself is doubled ended, relatively short in length and carried in a split main bearing. This arrangement of splitting up the crankshaft obviates the difficulties associated with producing split con-rod big end bearings in model sizes.

The front cylinder unit is of conventional single-cylinder form, in light alloy die casting with shrunk-in liner and screwed in head. The second cylinder is a similar unit, but faced off square at each (crankcase) end. These units bolt together, sandwiching the main bearing unit (incorporating the choke tube and spray bar assembly) between them, plus the addition of a conventional crankcase backplate on the rear cylinder unit. All parts were extremely well made, the pistons being exceptionally well finished (although not particularly well matching the cylinder bores) and utilising a captive gudgeon pin fastening enclosed completely within the piston. Allyn long reach plug were fitted as standard but performance appeared similar on K.L.G. plugs.

Summing up: A motor for the collector and connoisseur who has a liking for noisy exhaust notes!

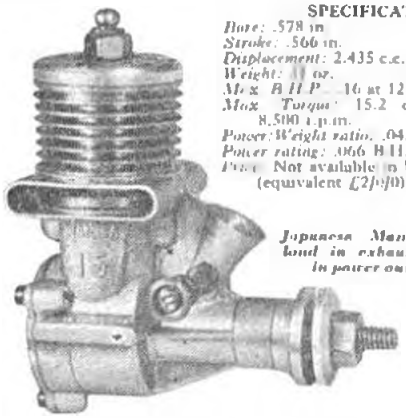
SPECIFICATION

Bore: .485 in.
Stroke: .405 in.
Displacement: 2.456 c.c. (.150 cu. in.).
Bare weight: 2¼ oz.
Price: $ 11.95 (U.S.A. only) equivalent £4/10/0.
Manufacturers: K. & B. Allyn Co., 5732 Duarte St., Los Angeles 58, U.S.A.

Number 19

GLOW PLUG ENGINES

—Mamiya 15



Japanese Mamiya is loud in exhaust, fair in power output

SPECIFICATION

Bore: .578 in.
Stroke: .566 in.
Displacement: 2.435 c.c. (.149 cu. in.).
Weight: 11 oz.
Max B.H.P. .16 at 12,850 r.p.m.
Max Torque: 15.2 ounce-inches at 8,500 r.p.m.
Power/Weight ratio: .043 B.H.P. per oz.
Power rating: .066 B.H.P. per c.c.
Price: Not available in U.K. (equivalent £2/5/0).

THIS JAPANESE engine is quite small and light for a 2.5 c.c. displacement and is characterised by first class design and workmanship throughout. It is pretty fair to say, in fact, that it is better than the average American glow motor as regards crankshaft bearing fit and good compression.

A particularly clever cylinder design feature is incorporated. The cylinder is of steel (unhardened) with two diametrically opposed by-pass ports milled in the sides. These ports are carried up through over half the thickness of the mounting flange, thus bringing the top of the by-pass ports very nearly level with the bottom of the exhaust ports.

The crankcase casting is a most intricate piece of work, and extremely well made. The only machine finishing required on it is facing for the back cover and drilling for the crankshaft bearing, which is brass. The big end bearing is also bushed with brass. The piston is of cast iron and is a lovely fit in the cylinder. Cylinder head is light alloy, lapped to fit the top of the cylinder (no gasket) and held down with four screws. Two of these screws extend into the crankcase casting to hold down the cylinder. All screw sizes appear B A—7 B A for the cylinder screws and 1 B A for the propeller shaft.

The crankshaft is ground with quite a drastic cut-out for the port and solid from the port forwards—possibly weak here on account of the stress raiser produced. The propeller backplate is not knurled or roughened.

The crankcase backplate has been a little skimped as regards material size, the lugs being just that little bit too small to be safe (one was actually cracked).

One really sad point about the design is the position of the needle valve—far too close to the propeller disc and bringing the hand in line with the exhaust when adjustments are made. The needle itself was finely made.

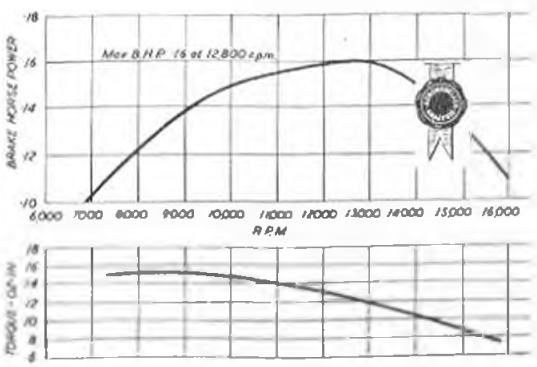
Starting characteristics are not all that brilliant. The engine was much happier running at speeds of 11,000 r.p.m. and above than at lower speeds. It was run up to 16,000 r.p.m. with propeller loads, but electric starting was largely employed, not so much from the safety point of view as to ensure positive results.

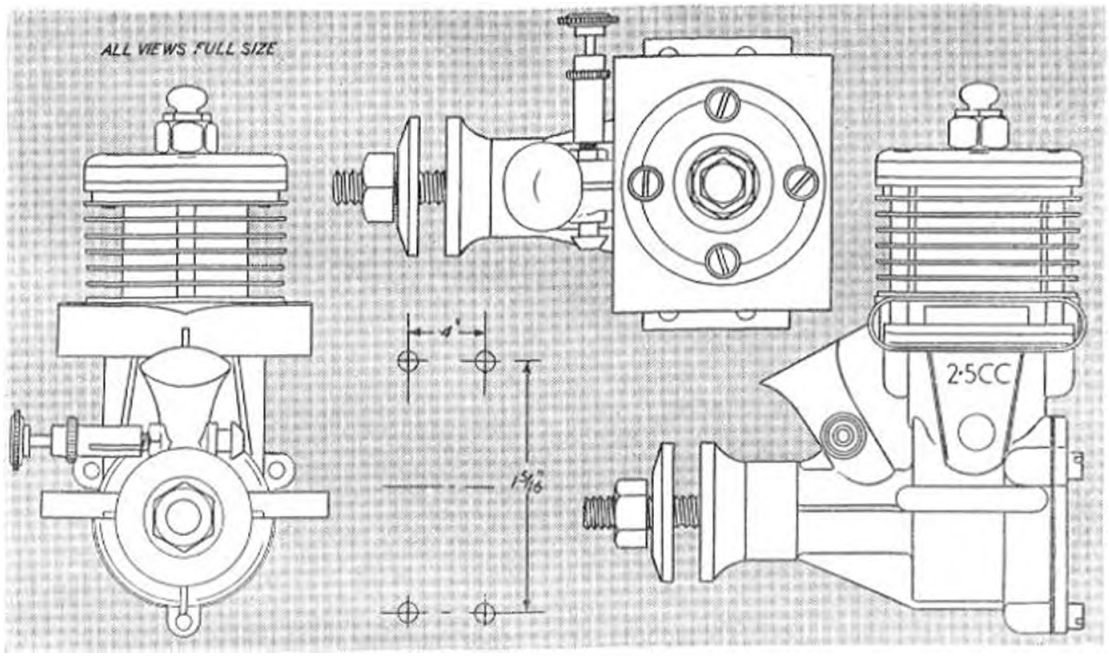
The Japanese glow plug was particularly interesting as having a heavy element which needed a full 2 volts to give a reasonable glow—appreciably less glow on identical voltage to a K.L.G plug, for comparison. Performance was identical on the original Jap. and K.L.G plugs.

Fuel used for all tests was a heavily-doped methanol-castor oil mixture—a 75 : 25 mixture of the latter with nitromethane added to a 22 per cent. (total) equivalent. The motor also ran well, without developing the same power, on a straight methanol-castor mixture. Summing up: a neat "Nip"; fine for sports flying or "open" contest work.

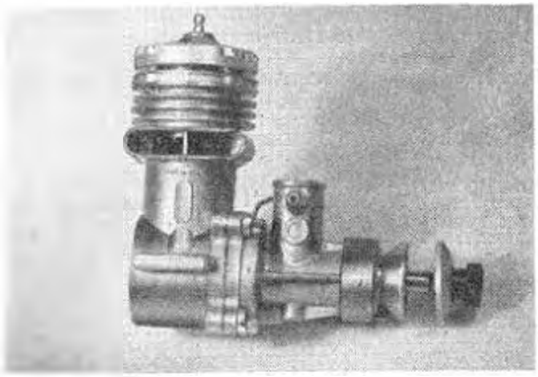
PROPELLER-R.P.M. TEST DATA		
9 x 6	Stunt	8,000
9 x 4	Trufio	9,100
8 x 4	Stunt	11,600
6 x 4	Stunt	15,500
7 x 4	Stunt	13,600

25% castor.
75% methanol
plus 25% Nitromethane.





Drawing above is of Japanese Mamiya 15



The Italian
Super Tigre G20
(Lappato)

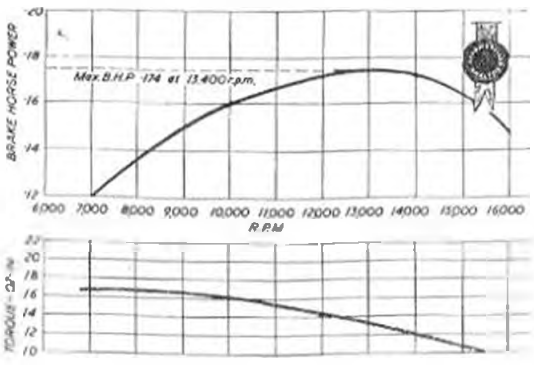
OVERALL IMPRESSION of this engine are generally excellent—superb workmanship, neat design features, wonderfully easy starting characteristics and a really pleasant engine to handle in every way. Being a glow plug engine, however, maximum performance does not compare with the best of the diesels of similar capacity in terms of brake horse power although its bare weight of 4¼ ounces gives it a high power/weight rating.

The crankcase and cylinder jacket, incorporating an integral backplate, is one exceptionally neat casting, cored for the tapering transfer passage and requiring only the minimum of finishing operations. This casting is very light and incorporates diametrically opposed exhaust and transfer for cross scavenging.

The hardened steel cylinder liner is a very tight fit in the crankcase unit and is held down by the cast light alloy head ground with a definite waist. (.002 in. down on diameter) and appears to have been ground between centres. The top of the piston incorporates a shaped baffle or deflector, the cylinder head being similarly shaped to receive the baffle at T.D.C.

The lower transfer port is controlled by the piston wall, a corresponding port opening being drilled in the piston itself (a feature seldom found on present day engines). The upper transfer port in the cylinder is not fully opened by the piston, but all ports are quite deep and of generous area.

The connecting rod appears to be a standard forging, machined at both ends (although there is no apparent reason for this) and also slotted to improve lubrication at both the big and little ends.



The crankshaft is very nicely made and is carried on two ball races. The front of the crankcase and the bearing unit is bolted in place with four screws, the rear ball race being recessed into both mating units and thus serves as a means of alignment as well as taking considerable load off the fixing screws—a neat design feature this. The shaft is drilled to well beyond the rotary port opening and the crank pin is also drilled out to quite a thin wall.

The intake tube, cast integral with the front unit, is vertical and laid out to take twin spray bars if required. Bosses are formed for the second spray bar position and drilling centres marked. A detachable venturi is locked in place by the spray bar. Presumably different venturis are available for slightly amended running characteristics. The one fitted gave exceptionally easy starting but a rather critical needle valve adjustment for consistent running at the upper end of the speed range.

Starting was easy to the point of being ridiculous. After finger chocking, and attaching the glow plug lead, just turning the propeller over almost invariably produced instant starting—a sharp flick was unnecessary. Running was not all that consistent down at the lower end of the speed range, but above about 11,000 r.p.m. the Super Tigre was very happy, apart from being critical on mixture adjustment. The Italian glow plug has a slight leak which could not be cured and burnt out at an early stage of testing. It was subsequently replaced by a long reach K.L.G. plug, which seemed to suit the engine very well, (in fact this plug is a recommended replacement.) Mercury No. 7 fuel was used throughout. Any propeller of finer pitch than 6 inches necessitated the use of packing washers, which was a little annoying, and the matching propeller hub hole for the shaft is 9/32 inch.

We had the impression that this engine could give rather more than the measured torque and r.p.m. figures—at the 1955 Speed Championships all the Italian team Tigres were turning 6 x 9 props. at 15,000 r.p.m. —but we could not attain that figure on standard fuel.

SPECIFICATION

Bore: .591 in. (measured) (15 mm. quoted)
Stroke .549 in. (measured) (14 mm. quoted).
Displacement 2.468 c.c. (.1506 cu. in.).
Bare weight 4¼ oz.
Max. B.H.P. .174 at 13,400 r.p.m.
Power rating .071 B.H.P. per c.c.
Power/Weight ratio .041 B.H.P. per oz.
Availability in England: Through private negotiation only, price circa £4 10-0.

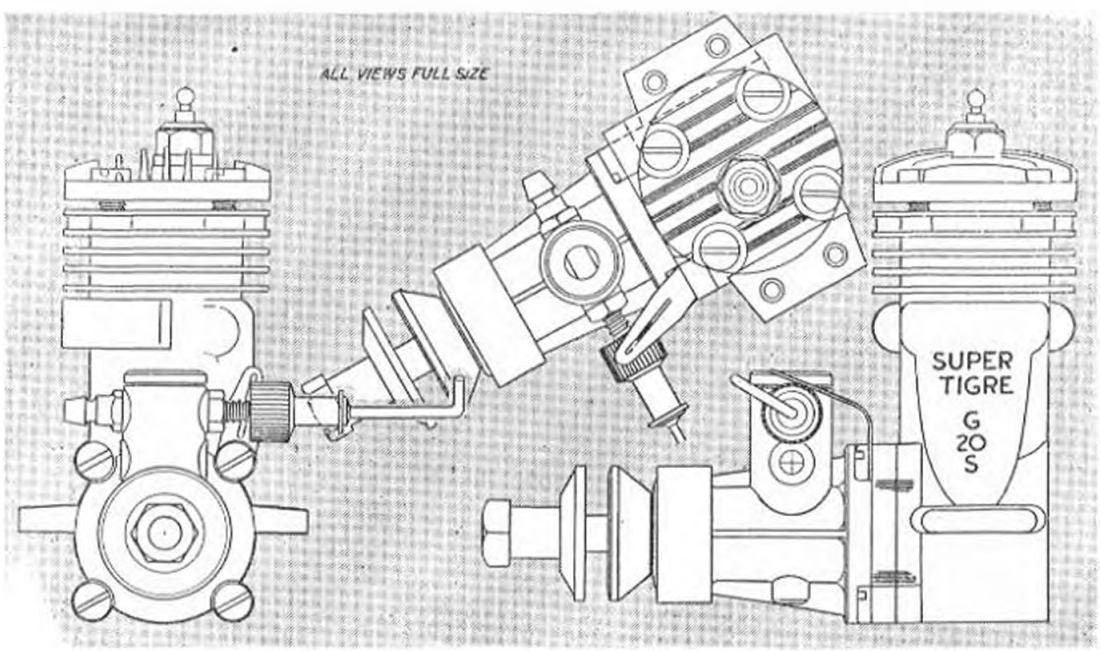
PROPELLER-R.P.M. TEST DATA

Propeller dia. x pitch	r.p.m.
10 x 6 (Nylon)	7,000
9 x 5 (Stant)	7,800
8 x 5 (Stant)	10,300
8 x 4 (Stant)	11,400
9 x 4 (Stant)	9,100
6 x 4 (Stant)	13,800
7 x 6 (Trucut)	12,000
7 x 4 (Stant)	13,200

Fuel: Mercury No. 7.

When taking apart after the tests it was discovered that the head was fitted with two gaskets and leaving one of these off would be a quick way of raising the compression ratio slightly (possibly a deliberate feature?), and this could give the extra revs. needed for speed.

Apart from the general neatness and excellent workmanship, another feature was the excellent compression, hot or cold. Fuel consumption was not measured, but appeared to be relatively high. Also a considerable quantity of fuel leaks out past the front ball race. Our only criticism, however, would be directed at the large overhang from the beam mounting lugs. Mounting holes, incidentally, require opening out slightly to take 6 BA screws. Summing up: A fine product, little appreciated outside of Italy, but worthy of any potential Champion's collection.



Aaark—"It's easy to tune up single-handed with this beautifully stable design"—says the Pelican

If you have never placed high in a contest you will stand a chance now by building this simple high-performance design with a contest pedigree

———by *JIM WALDRON*

WHEN A DESIGN enters its sixth contest season and still continues to win major events, it can be acknowledged as top of its class. Such is the qualification of this 6-ft. span lightweight sailplane which has so often brought the names of the Henley Club fliers into the leading places at national and club gala contests.

The prototype was first flown in 1949 and since then has been highly developed by designer Jim Waldron through no less than ten versions. Seven of these were built by clubmates and construction was simplified so that it can now be offered as a contest winner suitable for even the raw novice. In fact, it has been a "first" glider for several members of the Henley Club, notably that of Dave Painter, winner of the Thurston Cup at the British Nationals 1955. In open glider contests its advantage over A/2 gliders is apparent, not the least virtue being its larger size which enables it to stay in sight longer, while it is not of giant proportions and breaks down into convenient components for easy transport.

For those not familiar with the trail of success, here is its record:-

1st	THURSTON CUP	1955
3rd	THURSTON CUP	1955
1st	NORTHERN HEIGHTS GALA ...	1954
2nd	THURSTON CUP	1954
4th	PILCHER CUP	1954
2nd	C.M.A. CUP	1953
1st	HALTON CUP	1952
1st	HENLEY GLIDER CUP	1952
1st	HENLEY GLIDER CUP	1953
1st	HENLEY GLIDER CUP	1954
1st	HENLEY GLIDER CUP	1955

Also several flights of over 15 min. have been made and one flight of 23 min. by Tony Cooke's model.

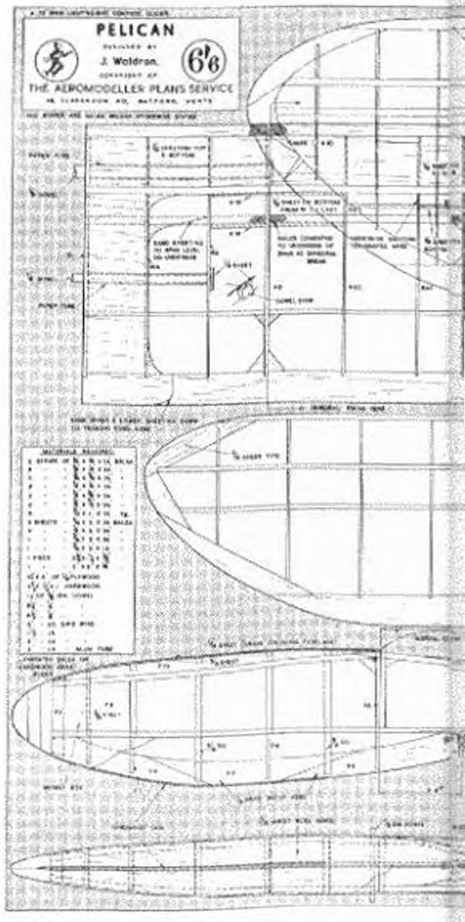
The technically-minded will appreciate that the wing area is 41 sq. ft., to which should be added another 200 sq. in. of tailplane, and yet the total weight is only 15-16 oz. Wing section is Isacson 64009, and designer Waldron employs the best effective wing chord of 9 in. to make full use of the light loading. Thus the aspect ratio is moderate, and the increased airfoil efficiency produces a commendable rate of sink.

To make the model non-critical on towhook positioning and easy to launch for the beginner, there is adequate forward keel area, and we have seen Jim demonstrate a "one-handed launch" in quite a strong wind by flying the model as though it were a kite.

With so much to recommend it, "Pelican" is bound to be a most popular design among the contest-minded, and the full-size drawing will be found to be complete in itself without need for extra instruction.

Jim passes on one covering note in that one should not attempt to attach the tissue to the underside of the wing ribs with paste. Thick dope or tissue cement is far better, and helps to retain a smooth undercamber throughout the span. One should also remember that

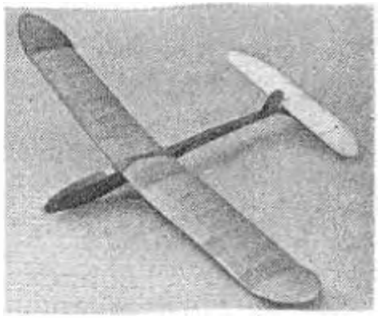
FULL-SIZE COPIES OF THE 1/6TH SCALE REPRO



much of the success of the Henley fliers has depended on their excellent system of model storage on wing boards as detailed in our September issue, and for absolute consistency, these boards are recommended both for building a model and keeping it in true form throughout its life.

Best flying trim is attained by balancing the wings laterally with Plasticine or lead at the light tip. Warps should not be tolerated and the hand glide angle is attained by adjusting tailplane incidence and rudder setting only without altering the C.G. position. The model should circle with a fairly wide radius and no undulation or stall be indicated in any conditions. For windy weather slight positive tail packing (one layer of Bristol board) provides just enough to maintain the same glide angle. In very strong winds the underwing braces of twine between wing and towhook should be fitted to relieve strain on the centre dowels.

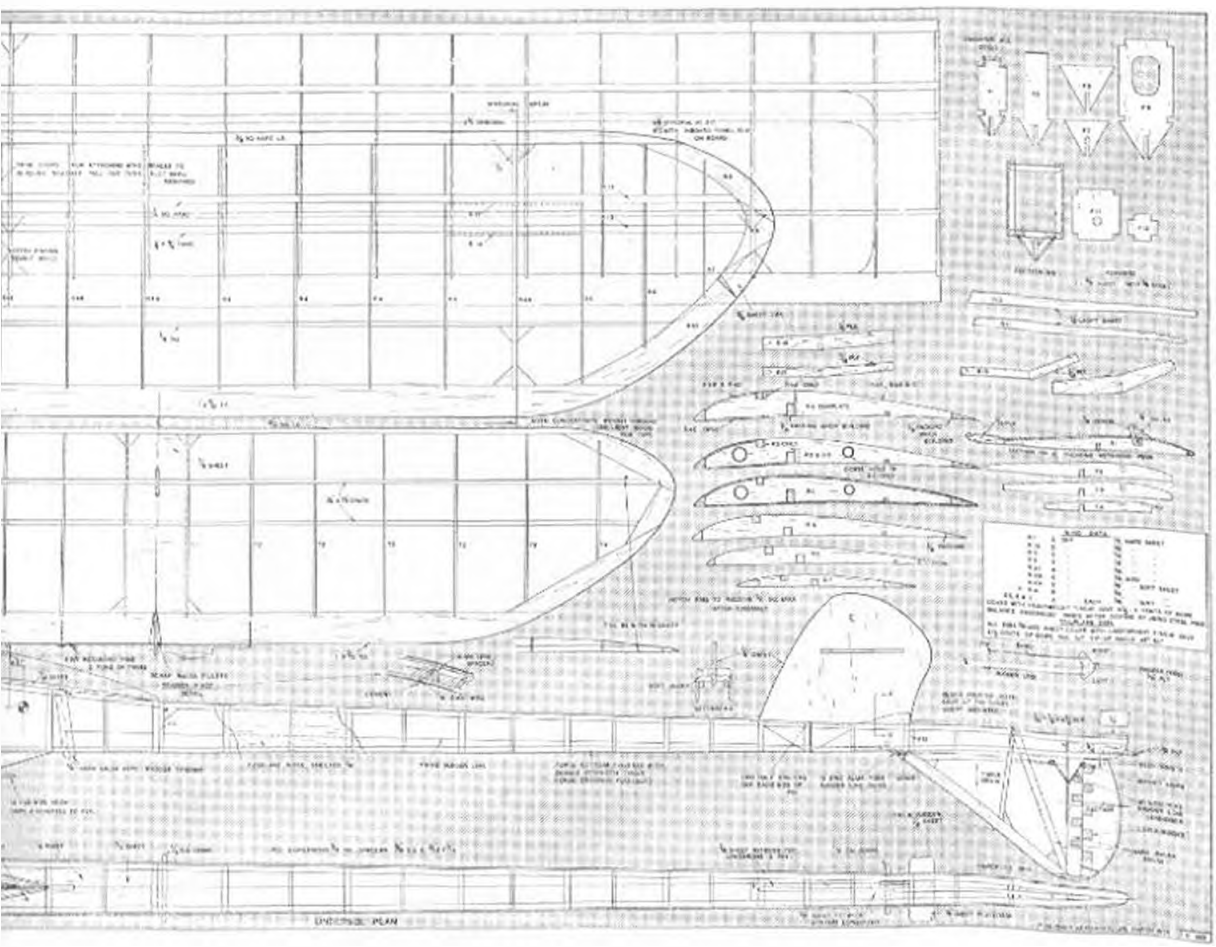
Single-handed tow launch is easy, even in a flat calm. Holding the model in one hand, at arm's length, and the winch in the other, run forward and release the model while allowing the line to pay out, using a finger on the side of the winch drum as a "brake". Greatest care is required in paying out the line evenly, without jerking it while running forward, but with a little practice this is easily mastered; in a light breeze it is hardly necessary to run!



Two-piece wings with simple dowel joiners, anti-warp structure and sheeted box fuselage make this almost a beginner's project. Patched prototype is a contest veteran with many hours flying to its credit

Note.—For towline do not use the 14-15 lb. line used for A/2 gliders. Use line with 20-22 lb. breaking strains—remember, you have an extra 200-250 sq. in. of wing area on *this* model.

A towline extension with 3/32 in. ply peg attached will be required for the auto-rudder operation—always ensure that the auto-rudder has only two positions.



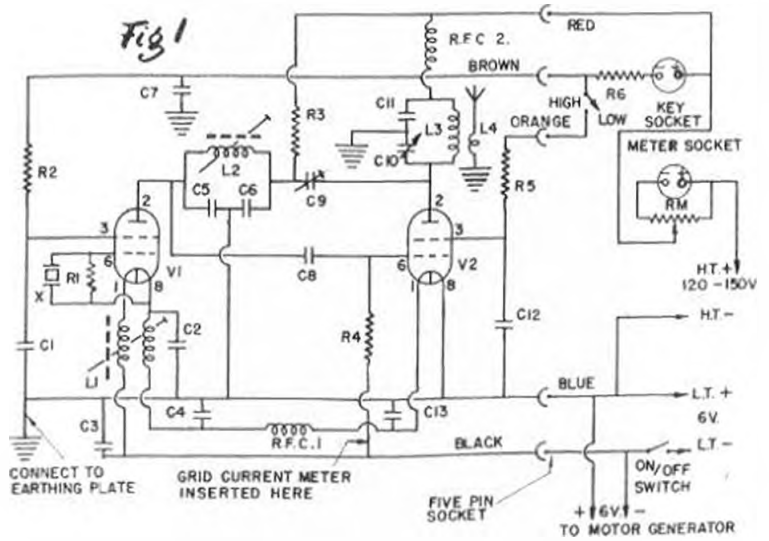
Radio Control Notes

HOWARD BOYS Describes

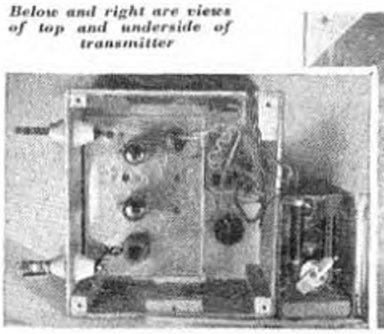
The McQUE CRYSTAL TRANSMITTER

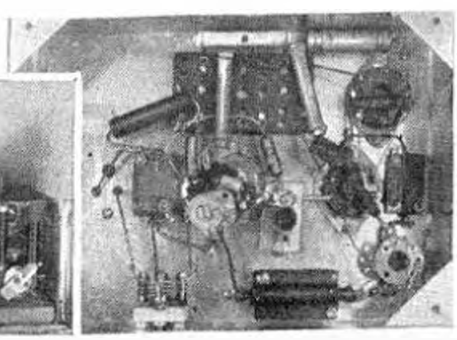
Warren Decker holds American Claud McCullough's symmetrical wing job equipped with truck type landing gear which has been very successful on rough ground and for crosswind take-offs. Span is 6ft. 1,000 sq. ins. wing area, weight 9 lb., and Babcock radio equipment

FOR OPERATING the crystal controlled superhet receiver previously described, a crystal controlled transmitter is essential. Here is Mr. McQue's own transmitter, of which three or four have already been built. The circuit is shown in *Fig.* 1, and it uses only two valves. One operates as a tritet crystal oscillator, the other being the power amplifier. Both valves are of the same type, 3D6, and are obtainable on the "surplus" market at 2s. 6d. to 3s. 6d. each. They can also be obtained brand new from radio retailers at about 15s. each, so they are not out of date. These two valves can be run with their heaters in series from a six-volt supply, which is to be preferred as it provides a safety bias for the P.A., in the event of the oscillator stage failing. They can also be run with the heaters in parallel as shown in *Fig.* 2, or from a 3-volt cycle battery by using them in parallel, connecting to pins 1 and 8, and Pin 7 disconnected. Another point of running them on six volts is that an accumulator can be used for this, and also to drive a motor-generator to provide the H.T. instead of using dry batteries. There is at the time of writing a most suitable small m/g on the surplus market at 15s. or thereabouts. It is only 4¼ in. long by 2¼ in. diameter and is rated for 12 volts input and 360 volts output. With six volts input it gives an output of 130 volts at 25 m.a., which suits this transmitter very well. The crystal used has already been mentioned, and is for one-third of the radio frequency. The anode circuit of the first valve is tuned to the radio frequency, and the second vale is a straightforward radio frequency amplifier. A high/low power switch is incorporated to allow tuning of the receiver at short range. There is a socket for a meter for setting up and checking the transmitter. Across this socket is a potentiometer of 50 ohms or more to suit the meter which can be the one used for checking the receiver, with a full scale deflection of 5 milliamps. The potentiometer is adjusted so that the meter reads 30 m.a. at full scale. The beginner building this transmitter would need help over this. A friend with a 30 or 50 m.a. meter, who knows how to use it, is required.



Below and right are views of top and underside of transmitter





A photograph shows the front view of the transmitter with two porcelain insulators and spring clips to hold the aerial on one side, and a toffee tin containing the motor generator on the other side. The box is made of plywood, but it has a metal bottom for earthing. Any transmitter in a wooden box needs a sheet of metal underneath for earthing. This is far better

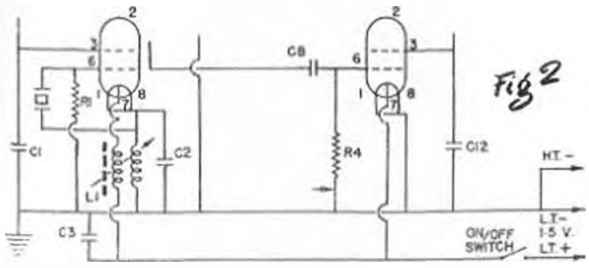


Fig 2

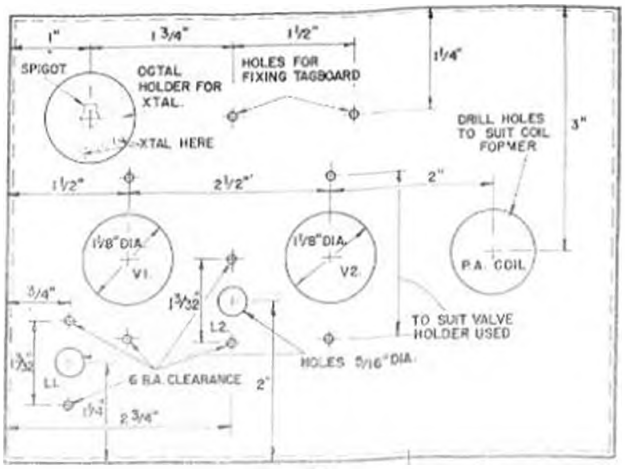
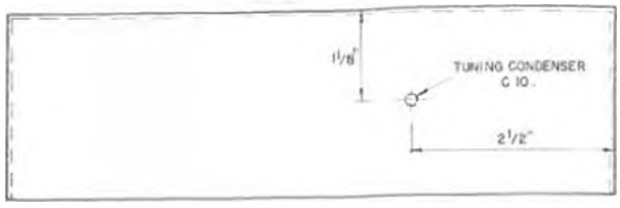


Fig 3



than a peg in the ground, because it has much the same effect whether the transmitter is on grass or tarmac. The chassis is mounted vertically in the box, so that the valves stick out towards the front. Below them can be seen the P/A coil, and to one side of the top valve is the crystal. The wires from underneath the chassis are brought through the valve socket holding the crystal.

The view on the back of the chassis shows a tag board bolted on for holding resistors, and the 1,000 pf condensers bolted down for rigidity. Some large resistors are shown, but they are not necessary. They were used because they were handy. The P/A coil tuning condenser can be seen with its adjusting screw through the side where it can be got at through the side of the box.

The components are C1 1,000 pf, C2 100 pf, C3 1,000 pf, C4 1,000 pf, C5 20 pf, C6 500 pf, C7 .01 mfd, C8 50 pf, C9 3-8 pf pre-set, C10 20 pf variable, C11 1,000 pf, C12 1,000 pf, C13 1,000 pf, R1 100k ohms, R2 27k ohms, R3 470 ohms, R4 47k ohms, R5 3.3k ohms. L1, two coils of 16 turns each, closely interwound, 26 or 28 gauge D.S.C. wire on ¾ in. Aladdin former with dust iron core. L2, 9 turns 20 or 22 gauge bare or enamelled wire, spaced the wire thickness, on ¾ in. Aladdin dust iron-cored former. L3, 7 turns, 18 gauge bare wire, spaced wire thickness, on 1 in. dia. former 1¼ in. long, wound at top end of former. L4, two turns 18 gauge insulated with sleeving, round the former between L3 and chassis. R.F.C.1, 8-9 feet, 28 gauge enamelled close wound on ¾ in dowel. R.F.C 2. 8—9ft. 32-36 gauge close wound on ¾ in. dowel.

When built, the transmitter has to be tuned in the following way. Switch on with the power switch on the "low" position. With the key switch made, and a meter in its socket adjust the core of L1 for minimum current. It will be found that screwing one way the current rises quickly, and screwing the other way the current rises slowly. Adjust the core half a turn up the slow side. Adjust the core of L2 for a dip in the current. This will not be very noticeable. The P/A now has to be neutralised. Insert a meter reading 0-2 m.a (if not available use 0-5 m.a.) in the grid lead of V2 at the point shown by the arrow head in *Fig.* 1. With the switch still in the low power position, rotate the P/A tuning condenser C10 through its full range, progressively adjusting the neutralising condenser C9 until the P/A tuning has no effect on the grid current. (L2 should be adjusted for maximum grid current.) Remove meter from grid lead and reconnect lead. Switch to full power and adjust the P/A tuning for greatest current dip. With the aerial attached, adjust the position of coil L4 so that the current dip is approximately 5 milliamps. It should be noted that the P/A tuning condenser C10 should be

(Continued overleaf)

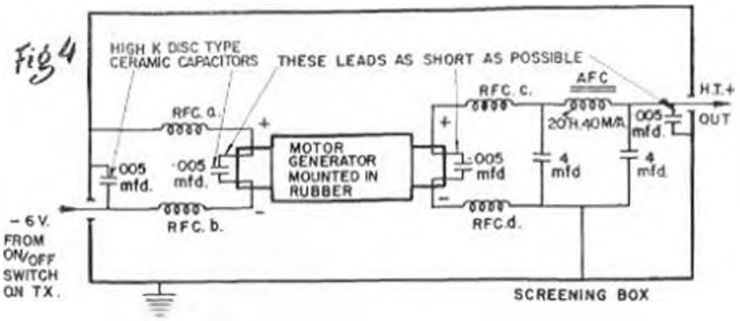


Fig 4

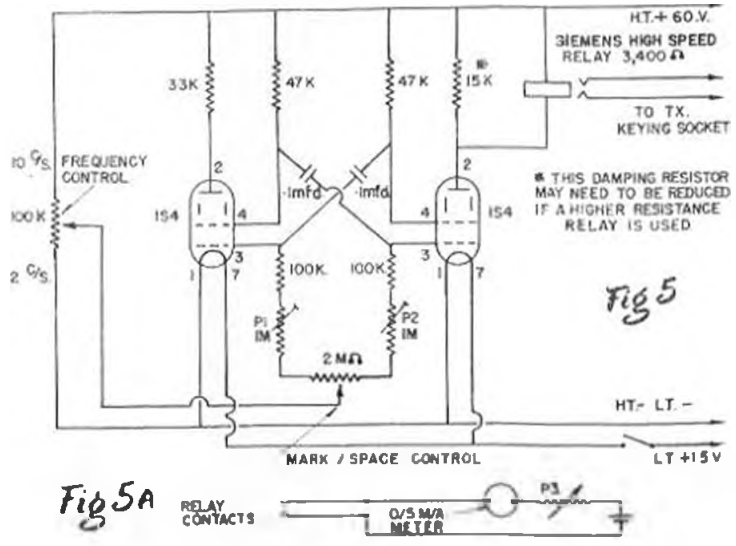


Fig 5

Fig 5A

RADIO CONTROL NOTES Cont.

adjusted for minimum anode current *on each site* to allow for different "earths" such as grass, concrete etc., The transmitter is now fit for service.

Fig. 4 shows the smoothing circuit and filtering when the motor generator is used. R.F.C. (*a*) and R.F.C. (*b*) each consists of 8 to 9 feet of 14 or 16 gauge enamelled wire close wound on ½ in. diameter dowel. R.F.C. (*c*) and R.F.C. (*d*) each consists of 8 to 9 feet of 32 to 36 gauge enamelled wire close wound on ½ in. dowel. A.F.C. is a normal smoothing choke that only needs to carry 30 milliamps. Most of these chokes are made to carry more current, but this is all to the good. The 4 mfd. condensers can be electrolytic for small size, but the larger paper type are safer because, if the six volts were connected wrong way round, the electrolytic type would be destroyed.

Fig. 5 shows the circuit of McQue's proportional mark space producer. It is the usual electronic type with a potentiometer to control the pulse speed. With this circuit the pulse speed does not vary much, so long as the 0.1 mfd. and 47k are matched. This controller can be built in an "oxo" tin and run from an ex-gov. combined H.T. and L.T. battery. Although 1S4 valves are shown there is no reason why other similar valves such as 3S4, N18, etc., should not be used providing both valves in the circuit are identical. P1 and P2 are used to set the limits of the mark/space and *Fig.* 5A shows the set up used. Firstly, adjust P3 to give full scale deflection with relay contacts shorted. Then turn main mark space control fully clockwise and adjust P2 for 80% average deflection. Now turn main mark/space control fully anticlockwise and adjust P1 for 20% average deflection and repeat process until no further adjustment is required. Lamps should then be 80 : 20 and 20 : 80.

Hard v. Soft Valves

The writer feels pleased with last seasons' flying; only two radio failures being experienced. For some unknown reason, the receiver, using a hard valve, lost its sensitivity, after a previous flight when everything was perfect. On one occasion the flight had been one of the best ever, and the model had just been left parked on the aerodrome for about an hour, and the next flight, down it came through failure to answer the signal, all within a few seconds of take-off. For the last contest and all subsequent flying, the XFG1 receiver has been used as it has a much better record of reliability. With hard valve receivers the sensitivity adjustment always seems very delicate. With the XFG1, this adjustment is a bit fiddling since it means varying the tuning coil and condenser, but there is a greater margin of error.

The final adjustment can be done with two small pieces of insulated wire twisted together.

It is this adjustment that makes it impossible to put a thoroughly satisfactory receiver on the market for use of the modeller without radio knowledge. For the man who knows how to handle the XFG1 valve, it is a worth while consideration. Of course, it needs a relay that will operate reliably on 1 milliamp, and relay manufacturers have not been very good at producing suitable types. In fact most relays have been pretty poor. The writers' relays are made from parts of a type designed by Tommy Ives. As marketed, these relays were a bit too flimsy for reliability, but stiffened up with plastic wood, they have been very good, and quite satisfactory on an anode current charge of 1 milliamp.

RAF GEN

How much do you know about the Royal Air Force?

ALTHOUGH THE Royal Air Force is the youngest of the three Armed Forces of the Crown, it has adopted from the Royal Navy and the Army various customs, traditions and practices which are held in as high regard, and with equal pride, as those of its sister Services!

The wits of the day went so far as to call the new Service the "Royal April Fools" because it was born on the 1st April, 1918, from a merging of the Royal Naval Air Service and the Royal Flying Corps.

From the first, the Royal Air Force met with much opposition, but its ultimate success was due to the drive and tenacity of the Marshal of the Royal Air Force The Viscount Trenchard, who can truly be called "The Architect" of the Service. Though "Boom", as he is affectionately called throughout the R.A.F., is now 83 years of age and has, sadly, become blind, it was he who created the Service, and weaned it, and he can be justly proud of his labours for his "child" has proved itself more than a hundredfold.

It was natural, from the start, that the Service should want its own distinctive uniform. Having been born during the 1914-18 War, those on Active Service continued to wear the uniforms of their respective Services; Officers in the Royal Naval Air Service wore their Naval uniform with gold rank stripes, whilst those in the Royal Flying Corps, continued to wear the double-breasted jacket (more often known as "the maternity jacket") which Major (later Lieutenant General Sir) Frederick Sykes had designed when the Corps was formed, or their Regimental tunics.

To understand how the familiar R.A.F. "blue" came to be adopted, we must cast our minds back to the Tzarist regime in Russia. After the Crimean War, British cloth manufacturers received orders to make liveries for the retainers of Russian noblemen. This practice continued and thrived until just before the October Revolution, when a large order was placed by the Tzar for blue cloth for his Army. When the Revolution took place our manufacturers were left with vast quantities of this material on their hands, and it was suggested it might be suitable for the new Royal Air Force. This move, it can be stated, saved many of these manufacturers from financial ruin and, at the same time, saved their employees from the horrors of unemployment.

In spite of much criticism and joking, the blue uniform was adopted.

Next month we will examine the "headache" of Rank Titles.

Aeromodelling Step-by-Step

SIMPLE UNDERCARRIAGES

A FIXED undercarriage on a power model needs to be carefully fitted. If it tears loose it is generally an awkward job to replace, since it is normally mounted on the ply front former, or firewall as it is sometimes known, before this part is permanently cemented to the fuselage. On the other hand, elaborate mounting methods may add unnecessary weight.

Most power model undercarriages are of the cantilever type, made from spring steel wire. That is to say, they are unbraced and bent from a single piece of wire. Steel wire is quite heavy and so it is again possible to add an unnecessary weight penalty by choosing an excessive wire diameter, with an eye on increased stiffness and rigidity. Wire of 16 s.w.g. size is quite suitable for small power models up to about 8-10 ounces total weight. Above that, 14 s.w.g. wire comes into general use for models up to about 20 ounces, and 12 s.w.g. wire for the larger jobs. 12 s.w.g. wire is roughly 3/32 in. in diameter. Sometimes 10 s.w.g. wire (approx. 1/8 in. diameter) is used on really heavy models but often a braced undercarriage is a better solution in such cases, using a smaller wire size. The main thing is to use good spring quality steel wire, not wire which is so soft that it bends readily.

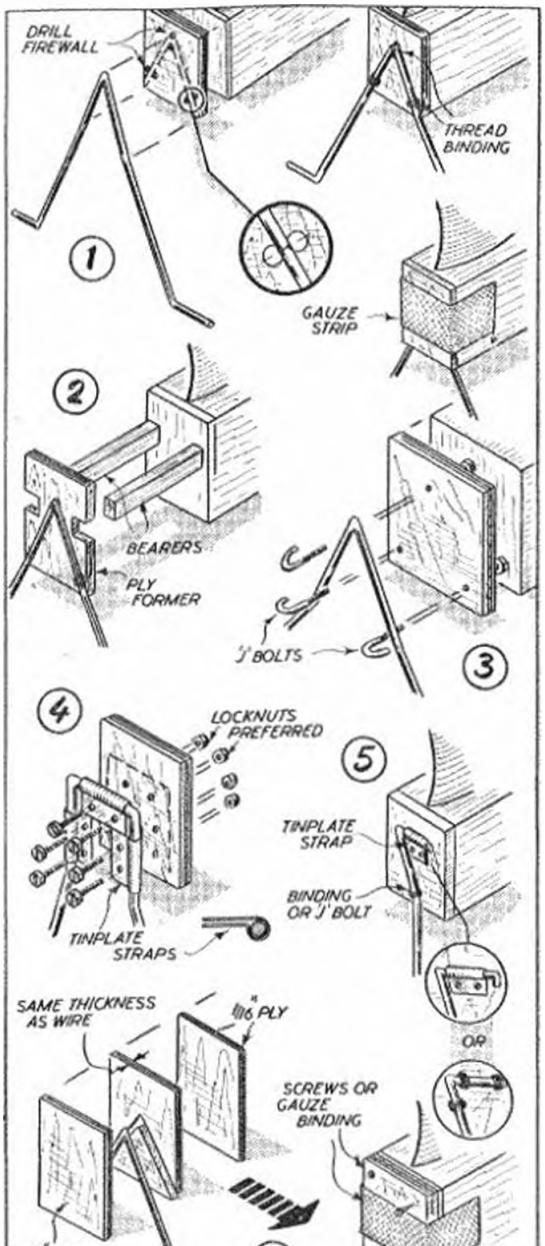
For most models up to International class size, the simple form of undercarriage shown in **1** is satisfactory. This involves the minimum of bends. The simplest and lightest method of attaching it to the firewall is by thread binding. The holes to take the binding should be carefully positioned in a line at right angles to the wire and spaced apart slightly *less* than the wire diameter to give a firm anchorage when the binding is applied. It is neater to cement the firewall in place with the undercarriage on the rear surface, although this means trimming the front of the fuselage to clear the wire. Additional strength is then given by binding around the front of the assembled fuselage with gauze bandage soaked in cement or the "setting" resins used in glass plastic moulding. Such an assembly is always stronger used with beam mounts, **2**. The beams help lock the firewall in place, and additional binding can be omitted.

Alternative to thread binding the undercarriage in place, J-bolts can be used **3** or tinplate straps fastened with 8 B.A. or 6 B.A. screws, according to the size of the unit—**4**. Both of these methods, and particularly the latter, are best suited to the larger, heavier models.

A tinplate strap is useful in fixing a single leg undercarriage—**5**. This can be combined with thread binding or J-bolts to anchor the leg itself. However, it is necessary to make sure that the top of the leg cannot move sideways, either by turning down the end of the wire, or with additional binding.

A method of undercarriage fixing much favoured in America, but seldom seen over here, is to sandwich the wire between three thin ply formers—**6**. The middle piece is made exactly the same thickness of the wire and cut out to take the shape of the top of the legs. When cemented up, the wire is trapped in the completed assembly quite securely. Use a slow-drying cement for this job and clamp the assembly until dry. A small woodscrew in each corner, or a gauze binding, is a precaution against the glue joints opening up.

The main secret with cantilever undercarriages is to keep the bends as simple as possible. The thicker the wire the more important this becomes. Ultimate shape will depend to a certain extent on the fuselage section—**7**—and must also be proportioned to give a reasonable *width* of undercarriage attached to the firewall.



AIRCRAFT DESCRIBED Number 78

Vickers Armstrong Ltd. SUPERMARINE WALRUS

WHEN IT FIRST appeared in June 1933 the Walrus was known as the Seagull Mark V, and was produced by Vickers-Armstrong Ltd., at their Supermarine Works, Southampton.

The first of the Seagulls flew in 1922, it had a wooden hull and was powered by the famous 450 h.p. Napier Lion arranged as a tractor. The Seagull III followed in 1924 with a more powerful Lion engine, and gave good service in Australia, among its achievements being the photographic survey of the Great Barrier Reef and Queensland coastline.

When the Seagull V appeared, it differed from previous types in having a pusher, radial engine, on single-bay wings, and a metal hull stressed for catapult launching. An alternative motor for this design was the Rolls Kestrel, but this engine was never fitted.

The amphibian was supplied to Australia as the Seagull and in August 1935 the first batch of 24 were delivered to the R.A.F. (F.A.A.) and production continued until the introduction of its tractor successor, the Otter.

That the Walrus continues to be of service to the Royal Navy and R.A.F., if only for ground instructional training, is a tribute to the hardy airframe. It was constructed almost entirely of metal —stainless steel and duralumin; the hull was flush-riveted and the fabric-covered wings had spars of stainless steel. The Walrus was the first military aircraft with retractable undercarriage to be adopted by the R.A.F., and the first amphibian ever to be catapulted with full military load. Each of these capabilities was to be fully taxed during the war years, and many are the anecdotes that can be related of the famous "Shagbat", which was its familiar nickname.

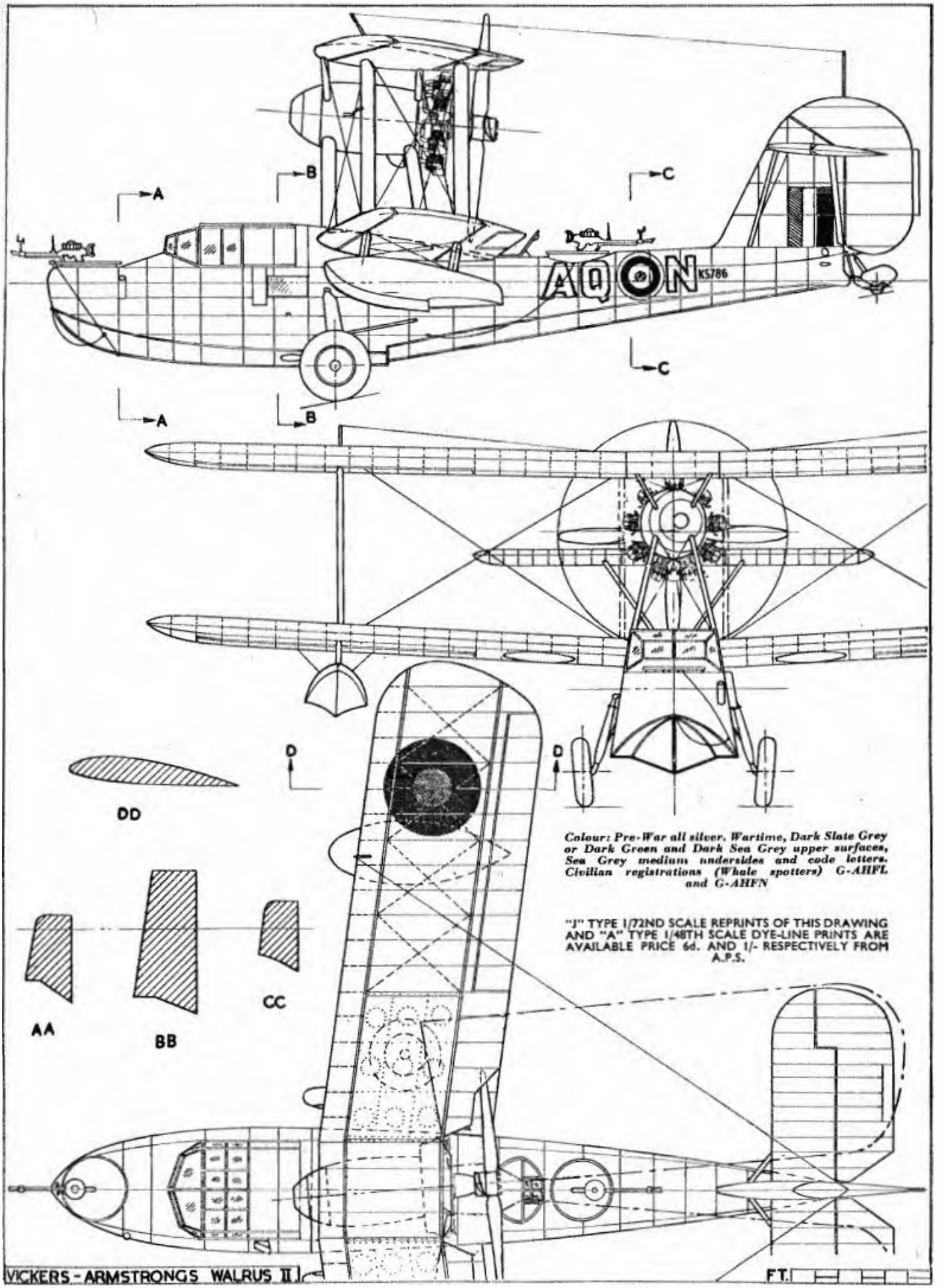
It was said that if any wartime aircraft spotter failed to recognise a Walrus he should be despatched to the coal mines as a "Bevin Boy". For such was the noise from its 18 open exhausts and the wind in its wires that by sound alone the Walrus was distinguishable from all other types, whilst the time it took to travel from point A to point B on the horizon enabled one to thumb through a complete volume of silhouettes for reference.

Bang—you're off! H.M.S. Warspite discharges one of her two Walrus II's, lettered 9A & 9B. Pre-war Silver Warspite Walrus was K8555 with black WO on nose. Bottom left: Argentinian version with anchor insignia and right: rescued pilot coming aboard camouflaged USN Mk. II version

Because of its ability to travel slowly, it was a fine spotting platform for Naval Gunnery, and in particular displayed this virtue during the bombardment of Genoa in February 1941. A Walrus circled the town at the modest altitude of 600 ft. whilst the Navy did their worst, and then returned safely to its ship unscathed. It also served as a dive bomber, though which was the more effective, the bomb explosion or the noise of the diving airframe, will never be known. Another escapade was the occasion of the seige of Tobruk, when a Walrus alighted at night in the harbour under full fire from the enemy and delivered urgent supplies. But perhaps the most famous of all its activities were those in the Air-Sea Rescue service, particularly along the South Coast during 1941-43.

Most operational stations near the coast had a Flight of mixed Walri, Spitfires A.S.R. 11c, and occasionally turret-less Defiants, and the Squadron supplying most of these Flights was No. 276 with code letters AQ, as depicted on the drawing opposite.

So busy were the pilots of 276 Squadron, that the ground crews hardly had time to mop out the gallons of sea water taken aboard during rescue! Sometimes there were too many aircrew for the Walrus to take off again—on one occasion the complete nine man crew of a B.17 were picked up and taxied back to Plymouth Harbour—and on a good many occasions the Walrus was attacked in its mission of mercy by enemy fighters.



Colour: Pre-War all silver. Wartime, Dark Slate Grey or Dark Green and Dark Sea Grey upper surfaces, Sea Grey medium undersides and code letters. Civilian registrations (Whale spotters) G-AHFL and G-AHFN

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

VICKERS-ARMSTRONGS WALRUS II

F.T.

Which size to build?

OUTCOME OF A GROUP DISCUSSION ON POSSIBLE APPROACHES FOR '57

WHICH IS BEST, a 1.5, 2.5 or even point-five? That was the question under discussion by a group of East Anglian modellers, including Nationals winner K. Rowsell and Mick King, among other Anglia, Laindon and Thamesside clubsters. Outcome of their thoughts—should the F.A.I. Rule change go through for '57, provided an interesting list of engines and a graph which might help the undecided.

The list shows all engines that have figures issued on the eddy-current dynamometer tests, and are placed in order of b.h.p. output per c.c. As the power loading is constant this gives a ratio of power available to the weight of model required. There are one or two obvious types missing from the list notably the Oliver Tiger (which can clear 14,000 r.p.m. on an 8 x 4 — ED.) to show up some remarkable fallacies.

The top three engines are all under 1.5 c.c. and the obvious question is why have 2.5's excercised such superiority in F.A.I. contests? Well, have they? Consider the following results; Barry Wheeler 1st in the 1952 finals with a 1.49, George Fuller's second in 1953 with a 1.8, John Gorham's fourth in 1954 and even more recent, Ken Lloyd's win in the first 1956 British Eliminators with a 1.49.

One point of note from the table is that peak b.h.p. is reached at high revs, mainly in the 13/14,000 range. These speeds are rarely reached *in the air* today, and a swing to slightly larger diameter props with less pitch, is a possibility.

The reason that these are not used today is the difficulty of handling the high gyroscopic and torque effects. With the larger models, this effect will be minimised and it is suggested, that if not already used, the following sizes be tried out as a very rough guide.

1 c.c.: 6 x 3 or 7 x 2
1.5 c.c.: 7 x 3 or 8 x 2
2.5 c.c.: 8 x 3½ or 9 x 2½

The graph gives all the required information for the new rules, and shows how a standard design will be affected.

From it you will see that the *Eliminator*, at present 1.49 powered, will now have a .85 diesel if used at the same weight. Increase the weight to 14 ounces and you can use a 1 c.c. Taifun Hobby which gives .1 b.h.p. compared to an Elfin B.R. 1.49's .158 b.h.p.

F.A.I. Class Engines

Figures quoted are from Eddy-Current Dynamometer.

Engine	c.c.	Max b.h.p.	Max c.c. b.h.p.	at revs.	Typical revs. prop.
Elfin BR 1.49 ...	1.49	.105	.158	at 13,600	13,700	7 x 4
Taifun Hobby	.98	.102	.1	at 13,400	14,000	6 x 3
Webra Record	1.48	.09	.133	at 13,000	13,000	7 x 4
Webra Mach 1	2.47	.088	.2175	at 16,700	13,250	8 x 4
Frog BH 2.49 ..	2.49	.083	.206	at 13,700	12,600	8 x 4
Oliver Tiger Cub	1.47	.082	.12	at 12,500	12,000	8 x 3
E.D. Racer ...	2.46	.080	.196	at 14,650	11,000	8 x 4
Taifun Tornado	2.47	.078	.192	at 14,000	12,000	7 x 6
Jaguar	2.48	.076	.188	at 12,750	13,750	7 x 4
K & B Torp 15	2.41	.076	.186	at 13,750	12,700	9 x 3
Frog 150 ...	1.48	.075	.111	at 10,800	11,600	7 x 4
Allbon Merlin...	.76	.075	.057	at 13,600	12,400	6 x 3
Webra Piccolo ...	.78	.075	.058	at 12,800	12,250	6 x 4
Allen Mercury 25	2.4	.072	.181	at 12,200	12,000	7 x 6
Allbon Sabre ...	1.45	.072	.104	at 13,300	13,300	6 x 4
E.D. Hornet ...	1.45	.061	.092	at 11,200	10,450	8 x 2
Allbon Dart ...	.55	.063	.034	at 12,350	11,800	6 x 4
E.D. Baby ...	.47	.061	.029	at 12,800	10,800	6 x 3
Frog 50 ...	.499	.061	.031	at 12,600	11,000	6 x 4

How would a model like this perform? With a loading of 4.8 ounces per sq. ft. and a decrease in power of 32% the climb will obviously be much slower. The model will have a great reserve of stability, and the nose length should be drastically increased to obtain a balance fore and aft.

Consideration must now be given to a first class glide, as opposed to the high speed climb now given preference when a model is designed. Even with an existing model weighing twice as much with the same engine, the climb is bound to be much slower. Pylons, hatchets, high thrust lines and low C.L.A. type of layouts may no longer be required, as they are only means of handling high power. Any simple A.2 layout would be found to have adequate stability if powered with a 1 c.c. diesel, which is all you could use without weighing it up.

Two items that require very careful consideration are the wing section and aspect ratio. The sections will come out of the "thinned-down-Clark Y era" and be somewhat similar to MVA 301 or NACA 6409, all with an eye to a good glide.

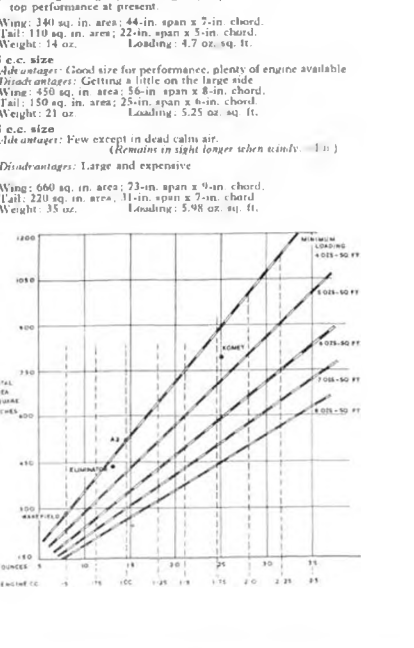
Aspect ratio is a thorny problem, and there are two opinions on this. One is that they would increase to still further improve the glide, the other that they would come down in order to obtain a compact model with as little frontal area as possible.

Three different sized models are envisaged by the East Anglians:

1 c.c. size
Advantages: Cheap, easy to build, reasonable size to handle
Disadvantages: Slightly inferior glide, require foreign engines for top performance at present.
Wing: 340 sq. in. area; 44-in. span x 7-in. chord.
Tail: 110 sq. in. area; 22-in. span x 5-in. chord.
Weight: 14 oz. Loading: 4.7 oz. sq. ft.

1.5 c.c. size
Advantages: Good size for performance, plenty of engine available
Disadvantages: Getting a little on the large side
Wing: 450 sq. in. area; 56-in. span x 8-in. chord.
Tail: 150 sq. in. area; 25-in. span x 6-in. chord.
Weight: 21 oz. Loading: 5.25 oz. sq. ft.

2.5 c.c. size
Advantages: Few except in dead calm air. (*Remains in sight longer when windy.* — Ed.)
Disadvantages: Large and expensive
Wing: 660 sq. in. area; 73-in. span x 9-in. chord.
Tail: 220 sq. in. area; 31-in. span x 7-in. chord
Weight: 35 oz. Loading: 5.98 oz. sq. ft.



Snowbound scene was not cold enough to deter two Sheffield M.A.C. members in recent heavy weather

CLUB NEWS

IT'S A FUNNY thing that modellers seem more apt than most in leaving their addresses out of correspondence—a standard file is kept in AEROMODELLER Plans Service for such absent minded characters. This month, however, a new twist to this old story turned up—we actually had a club report in without knowing which club or even which area it came from! By a bit of detective work on the blurred postmark we think we have it right—but please, fellers, don't make a habit of it, will you?

East Anglian

An interesting item of news taken from **CAMBRIDGE M.A.C.** news sheet is that G/C Chalkfield, popular C.O. at Waterbeach, has now been posted and promoted to Air Commodore. During his two years at Waterbeach, the aeromodelling movement, both local and national, benefited from his keen interest. The Cambridge Club's A.G.M. was well attended, and two controversial bans, one on junior recruits below 16 years old, and the other on proxy flying, were rescinded.

Winter activities are limited in the aeromodelling section of the **CHITTAL A.S.C.**, although a little flying still takes place. At the A.G.M., cups were awarded as follows: Team race: D. Joyce, Seale, K. Harrison. Best all-rounder, E. P. Edwards. Eats, a film show and a recognition quiz ended a most successful meeting.

Southern

A publicity drive with the aim of increasing membership is being undertaken by **GOSPORT D.M.F.C.**, and local modellers are asked to get in touch with the new secretary (address at end).

South Midland

A new club in this area has been formed in Amersham for youngsters from the St. Mary's C. of E. School. At present meetings take place at the house of one of the school teachers, and as a result membership is restricted. Difficulties in finding flying space are already bringing a boat element into the club.

North Eastern

Membership in **NOVACASTRIA M.A.S.** is still on the increase, and stands now at about 50. A successful 1955 culminated in the installation of a new club president, in the person of S/Ldr. James Rush, A.F.C., a well-known figure in full-size aviation, and a one-time winner of the King's Cup.

Western

Still plugging at the local council is **SOUTH BRISTOL M.A.C.**, who are anxious to have the total clamp on flying in Bristol lifted for at least one small C/L site, especially with Lulsgate Aerodrome being very doubtful for the future. So far, alas, the council shows no signs of relenting. Club members journeyed to Lulsgate for a competition day on January 8th, and despite high winds and snow showers, an enjoyable time was spent.

Northern

First 1956 success of **HEATH AERO-MODELLERS** was a win in Class B at the

S.M.A.E. CONTEST PROGRAMME

25th March

GAMAGE CUP: Unrestricted Rubber
PLEICHER CUP: Unrestricted Glider
} De-centralised

8th April

S.M.A.E.: 2nd Glider Eliminators
HARROW SHIELD: Team Rubber
WOMEN'S CHALLENGE CUP: Unrestricted Rubber, Glider
} Area
JETEX CUP: Jetex

15th April

AEROMODELLER TROPHY: R/C Contest Centralised

22nd April

‡WESTON CUP: 2nd Wakefield Eliminators
} Area
ANTRAL TROPHY: 2nd Power Elimints.

6th May

HAMLEY TROPHY: Unrestricted Power De-centralised

20th May

*PEARSTON CUP: Glider
DAVIES TROPHY: Team Race 'A'
SHORE CUP: 2.5 c.c. PA Model
GOLD TROPHY: Control/Stunt
S.M.A.E. TROPHY: Radio/Con.
} (Sunday) British Nationals Water-beach

21st May

*SIR JOHN SHELLEY CUP: Power
*MODEL AIRCRAFT TROPHY: Rubber
} (Monday)
DAVIES TROPHY: Team Race 'B'
BOWDEN TROPHY: Precision Pr. A
SEPTIC SCALE TROPHY: Pr. Scale
TAPLIN TROPHY: Radio Control
LADY SHELLEY CUP: Tailless
} British Nationals Water-beach

‡*Plugge Cup Event.*
**These Contest will decide the Area Championship.*
"Aeromodeller Trophy" will be used as an Eliminator for the King of the Belgian Cupon 15th/18th June at Antwerp. Competitors for this event will have to pay their own expenses.
It is hoped the Trials will be held not later than 10th June.

Heanor Rally. A wide variety of scale jobs have appeared, including two *Invaders*, one *Catalina*, one *Lancaster*, and a *Mosquito* (now defunct), all E.D. 2.46 powered.

An interclub bloodbath between **STOCKTON D.M.F.C.** and **THORNABY PATHFINDERS** saw an aggregate time of 23 : 45 for the former against 17 : 26 for the latter. A large wood downwind would have been much more of a menace had it not been for a keen local farmer, who provided a good long ladder.

South Eastern

Ill luck attended **BRIGHTON D.M.A.C.**'s Boxall brothers' excursion to the Blackheath Gala. Reg managing a max. on his first glider flight, but being unable to find the model, and turning in only 1 : 25 in the second round. Club feeling on the F.A.I. business is that new rule models will be useless for open work, which will limit eliminator entries and discourage younger members from building international models.

Scale control-liners nearing completion in **EASTBOURNE M.F.C.** include a four-E.D. 2.46 *Fortress*, a *Seamew*, and a *Fury*. Team racers and gliders are also receiving attention. The club is looking well ahead to a C/L demonstration in June, and hope that they have at last found a permanent club-room. New members of any age and standard are very much wanted (Sec.—13 Bradford Street, Old Town, Eastbourne.)

Midland

Cold squally weather for the **WORKSOP AEROMODELLERS'** annual Boxing Day meet at least means lots of volunteers for starting jet jobs! P. Russell's 7-year old jet won the speed handicap at 130 m.p.h. and a terrifying combat final was won by P. Farnsworth. Later Bridget Russell put the boys to shame by winning a pretty technical quiz with a score of 52%. Big flying scale V.1. is the most spectacular model on the building board at present.

The 12 month old **LONG EATON M.A.C.** has risen from 6 to 40 members, and has an excellent flying field and an outstanding clubroom. This club also runs its own insurance scheme for lost models, at 1d. per week! The *B.G.* 44 has been adopted as the club A/2, and it is hoped that several will be available for competition flying in the coming season.

DERBY M.A.C. started the year off with tying for top junior prize for combat (A. Jackson) at the Heanor Rally; this was strictly a co-operative effort with planes and engines being passed down to modellers still in the fight! The last member was forced to retire in the semi-finals—he was flying a junior's stand-by model equipped with an Oliver Tiger from an early wreck. After a few circuits the drag of the model quarrelled with the thrust of the engine, and out went the Tiger complete with bearers!

Indoor activities in **LEICESTER M.A.C.** have included a successful dinner and a mid-letex R.T.P. speed record put up by C. Rodwell's animated cigar tube, which reached 75 with a Jetex 50. The timer is still trying to get his eyes back into focus.

Several club reports commend the efforts of **HEANOR D.M.A.C.** for their Control Line Rally, and the Heanor members would like to thank all the clubs who braved the elements to attend.

South Wales

A considerable increase of activity is reported in **CARDIFF M.A.C.**, an indication of which was the 26 entries for the club control line comps held on January 15th. Contest consciousness is on the increase, and several Oliver Tigers are settling into racers ready for a crack at the 1956 contests.

Continued from Page 135

"And now, it may be asked, what has been done? This has been done: a flying machine, so long a type for ridicule, has really flown; it has demonstrated its practicability in the only satisfactory way—by actually flying, and by doing this again and again, under conditions which leave no doubt. There is no room here to enter on the consideration of the construction of larger machines, or to offer the reasons for believing that they may be built to remain for days in the air or to travel at speeds higher than any with which we are familiar; neither is there room to enter on a consideration of their commercial value, or of those applications which will probably first come in the arts of war rather than those of peace; but we may at least see that these may be such as to change the whole conditions of warfare, when each of two opposing sides will have its every movement known to the other, when no lines of fortification will keep out the foe, and when the difficulties of defending against an attacking enemy in the air will be such that we may hope that this will hasten rather than retard the day when wars shall cease."

"I have thus far had only a purely scientific interest in the result of these labours. Perhaps if it could have been foreseen at the outset how much labour there was to be, how much of life would be given to it, and how much care, I might have hesitated to enter upon it all. And now reward must be looked for, if reward there be in the knowledge that I have done the best I could in a difficult task with results which it may be hoped will be useful to others."

"I have brought to a close the portion of the work which seemed to be specially mine—the demonstration of the practicability of mechanical flight, and for the next stage, which is the commercial and practical development of the idea, it is probable that the world may look to others. The world, indeed, will be supine if it does not realise that a new possibility has come to it, and that the great universal highway overhead is now soon to be opened."

Prophetic words, indeed, in the year 1897.

During the course of these experiments recounted by Langley some thirty models were built, and following the successful flights he achieved Langley was persuaded by the American War Department to construct a man-carrying machine. It was here he suffered his greatest disappointment as the full size 'aerodrome' as it was called, crashed into the Potomac during launching and the project was abandoned. Only nine days later the Wright brothers made their historic flight at Kitty Hawk in North Carolina and thus became the first men to fly in a heavier-than-air, mechanically propelled, aircraft. The failure of Langley's flight was due entirely to wrong methods of launching, the aircraft fouling the launching carriage at take-off. It is interesting to note that in 1914 Glen Curtiss, the early American aeronaut, obtained permission to take Langley's original machine from the Smithsonian Institute, whereupon he fitted it with floats and flew it successfully from Lake Keuka in New York State, thus vindicating Langley's genius

London

A new club in the area is **WANSTEAD A.C.** with an initial membership of 12 and every intention of affiliating in the near future. It is hoped that a local schoolroom will in future be used for regular meetings.

Interested parties are invited to contact members of **HAYES M.A.C.** on Hounslow Heath on Sunday, or drop a note to the Secretary (43 Keith Road, Hayes). Five entries were made in the Blackheath winter comps., with J. Marshall placing second in rubber.

Also successful in the Blackheath comps. was A. Syme of **NORTHWICK PARK M.A.C.**, whose 4 : 51 in the Bill White won best junior prize. The first of the winter talks was given on January 11th by Malcolm Young of Northern Heights, on the subject of forces and air flow considerations in circling flight, and led to a great deal of discussion among members.

The very excellent journal of the **SIDCUP A.S.** has again run to a bumper Christmas number with a considerable amount of informative as well as amusing matter on its 12 foolscap pages. Club activity is still furious with the accent on control line.

The creditable total of 106 entries was reached in the **BLACKHEATH M.F.C.** Winter Gala and this year's event was distinguished by Australian participation in the persons of Alan King and Bond Baker. Despite cold wintry weather the flying was of a particularly high standard, and a fly-off was required in the Bill White.

Bill White Cup (22 entries)

1st. J. O'Donnell, Whitehall, 8 : 30
2nd. J. Marshall, Hayes, 7 : 30
3rd. D. Partridge, Whyteleafe, 5 : 28

Winter Glider Contest (86 entries)

1st. M. King, Thameside, 5 : 49
2nd. Brown-Edwards, Farnborough, 5 : 31
3rd. R. Yeabsley, Croydon, 5 : 26

East Midland

FORESTERS (NOTTINGHAM) M.F.C. abandoned their usual annual dinner for an informal bunfight, at which everybody had a shmashin' time! The following club scramble comp. saw juniors placed first and second, F. Elkin's tiny rubber model averaging a minute a time to clock 18 : 44 in one hour, wresting the cup from P. Bill, who had won it for four years in succession with his *Debutante*. The club's first 1956 venture was rewarded with first in Class A at the Heanor Rally.

North Western

WHITEFIELD M.A.C. Christmas get-together was most enjoyable, and included a full film show by E. Horwich. New member is Henk Toersen, 1955 Dutch Wakefield team member over here for an engineering course. The club is feeling a little rueful over the 1955 Plugge Cup results, since it would have been theirs but for an error in addition way back in May. Nevertheless, the club offers their congratulations to Croydon for once again winning this trophy.

Icy and windy conditions marred a recent **SHARSTON D.M.S.** all-in comp., but six members bravely entered, top being J. Fletcher's 2 : 12 two-flight aggregate. High thrust line jobs are all the rage following the recent *Aeromodeller Annual* article, and a successful model of this type built by a club member.

The annual control line rodeo will be staged by **CHESTER M.F.C.** on August Monday again this year.

The annual dinner, prize-giving, and film show went down well with **CHEADLE D.M.A.S.** members, but the regular Boxing Day scramble was an easy win for the weather since there were no other entrants!

Pen-pal requests come from Rudolf Kolaja, Sadova 1, Bodenin, Czechoslovakia, who is looking for someone about 17, willing to exchange AEROMODELLER for the Czech *Letecky Modelar*, and from I. White, 70 Greenwood Road East, Benenill, Wythenshawe, Manchester, who is a 14 year old free flight power fan anxious to get in touch with an American of similar interests.

Cheers once more,
THE CLUBMAN

NEW CLUBS

WANSTEAD A.C.
D. R. Platt, 97 Inglehurst Gardens, Ilford, Essex.

STREET M.A.C.
F. T. Turner, 34 Hound Wood Drive, Street, Somerset.

SECRETARIAL CHANGES

GOSPORT D.M.F.C.
A. R. Leserve, 168 Albemarle Avenue, Elson, Gosport, Hants.

ILMINSTER D.M.A.C.
W. J. Jewell, 9 Winterhay Terrace, Ilminster, Somerset.

LEICESTER M.A.C.
D. P. Kenney, 14 Mursell Street, Leicester.

TYNEMOUTH M.A.C.
R. Pollard, 31 Donkin Terrace, North Shields, Northumberland.

PLYMOUTH M.I.C.
A. G. Allan, 8 Western College Road, Mannanbead, Plymouth, Devon.

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