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contest designs ▸ radio control ▸ model news ▸

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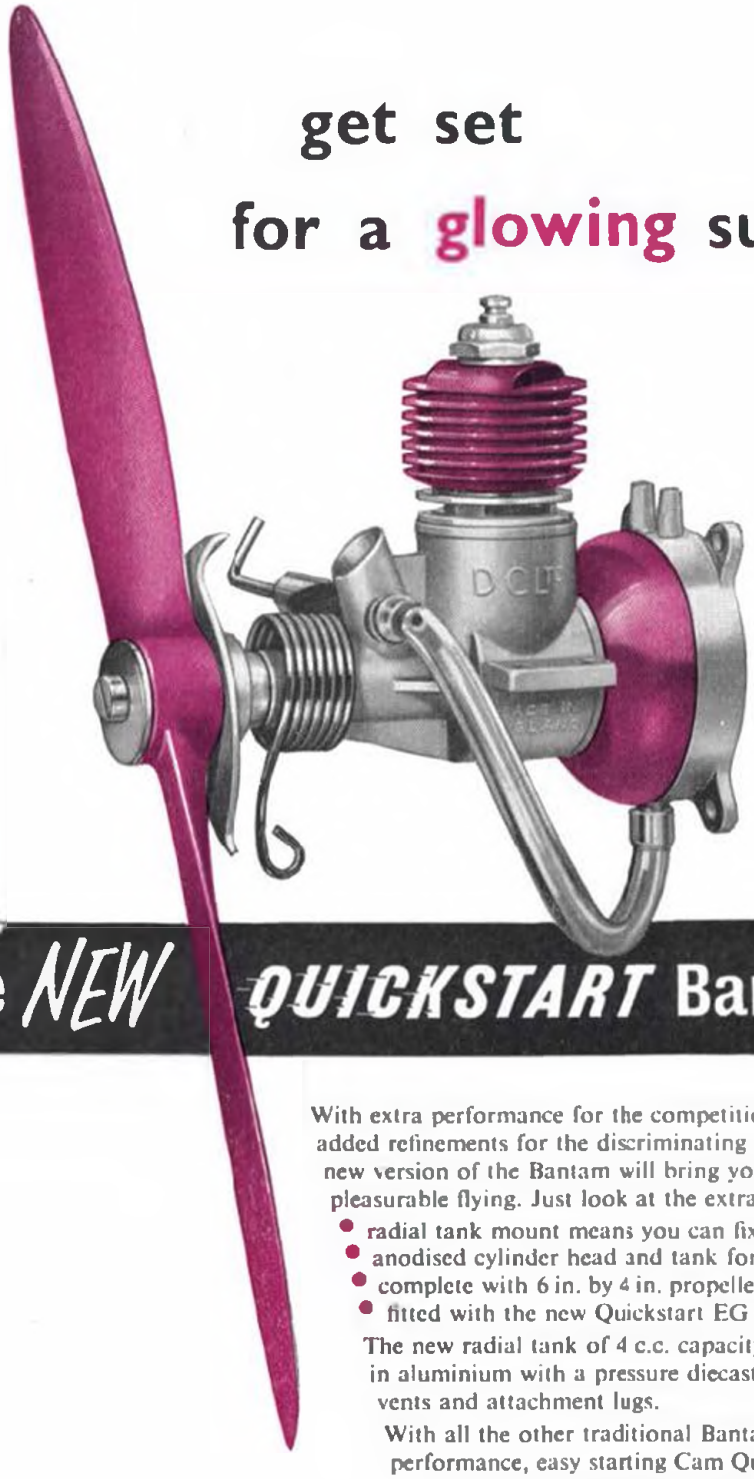

get the *NEW* *QUICKSTART* Bantam De Luxe

With extra performance for the competition enthusiast and added refinements for the discriminating modeller, this new version of the Bantam will bring you countless hours of pleasurable flying. Just look at the extras it packs:

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AERO MODELLER

MAP HOBBY MAGAZINE

February 1962

VOLUME XXVII No. 313

contents

cover

Back again after a long break is George Cox's popular Famous Biplanes feature, and in this issue he deals with the most heavily produced Biplane of the second World War. Front cover shows a beautifully restored Boeing-Stearman PT-13D which was presented to the USAF Museum at Dayton, Ohio, USA. Only the balloon tyres and wrong size wing markings distinguish it from an original. Incidentally, yet once more George Cox establishes a new standard in accuracy. Any resemblance to previously published Stearman PT-13 drawings is purely coincidental. Copious manufacturing reference drawings have enabled George to produce an indisputable addition to his series.

next month...

Radio control is fast reaching the stage where we can use "fit and forget" equipment—well, *almost* (!) Anyway, modellers are demanding better looking and "different" subjects for single channel and intermediate control. In answer, we have the renowned P. E. Norman's latest near scale midget racer, based on the famous American "Goodyear" full-size racers. Who else but "P.E." could produce the most crash-proof toughie? Moreover, we know you'll like the sleek lines of his 42½ in. span model for 2.5 c.c. that performs like a scalded cat and is introduced into AEROMODELLER Plans Service next month. Those who seek unconventional sport models will like Vic Smeed's Double Delta for the little Cox engines or similar. FULL SIZE PLANS for this 24 inch easy to build, easy to fly novelty will be included in next issue! For the scale men; Peter Gray details the famed Sopwith Dolphin. For the ingenious: a Gadget Review. For the practical; Jim Baguley on Glider Structures and for every modeller, loads of interest and news.

other modelling angles...

February edition of our companion magazine RADIO CONTROL MODELS & ELECTRONICS has dimensioned details of American Herb Clukey's teeny little radio bipe for lightweight gear and .020 engine, appropriately named the "Radi-O-Too" as an immediate answer to those who query its purpose. For multi-men there's a feature on channel allocation—which reed for which relay etc. For the home constructor, some really useful gen on do it yourself transformers . . . plus lots of other R/C news. In February MODEL MAKER & MODEL CARS, the latest on lightweight car construction and a report on the Aintree 200. For Yachtsmen, John Lewis talks of twin fin experiments and Dick Priest on racing tactics. For Power boaters, Vic Smeed's 42 inch version of the fast Fairey Huntsman, and for scale car enthusiasts, a Prototype Parade drawing of the Sunbeam Alpine.
Both magazines are the same price . . . 2/- per copy. If your hobby shop or newsagent does not carry stock, send 2/4 for return post delivery from address below.

reminder...

Indices for all three Model Aeronautical Press magazines are now available for the 1961 issues. Send 1/- plus stamped and self addressed envelope (3d. stamp for United Kingdom readers) for copies of either MODEL MAKER or AEROMODELLER indices, 6d in the case of RADIO CONTROL MODELS. All three for 2/6 plus envelope. Handsome "Easibinders", specially made for our magazines are also available price 12/6 from the editorial offices.

Editorial and Advertisement offices

38 Clarendon Road, Watford, Herts

Telephone: **Watford 32351** (*Mon.-Fri.*)

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Application to mail at second class postage rates pending at New York N.Y. Registered at the G.P.O. for transmission by Canadian Magazine Post. American enquiries regarding subscriptions, news stand sales and advertising should be sent to: AEROMODELLER, Eastern News Distributors Inc., 255 Seventh Avenue, New York 1, N.Y., U.S.A.

Direct subscription rate (Inland) 28/6 (Overseas) 27/6 per annum including enlarged December edition and index, U.S.A. and Canada direct rate $4. AEROMODELLER incorporates the MODEL AEROPLANE CONSTRUCTOR and is published monthly on the third Friday of each month prior to date of publication by:—

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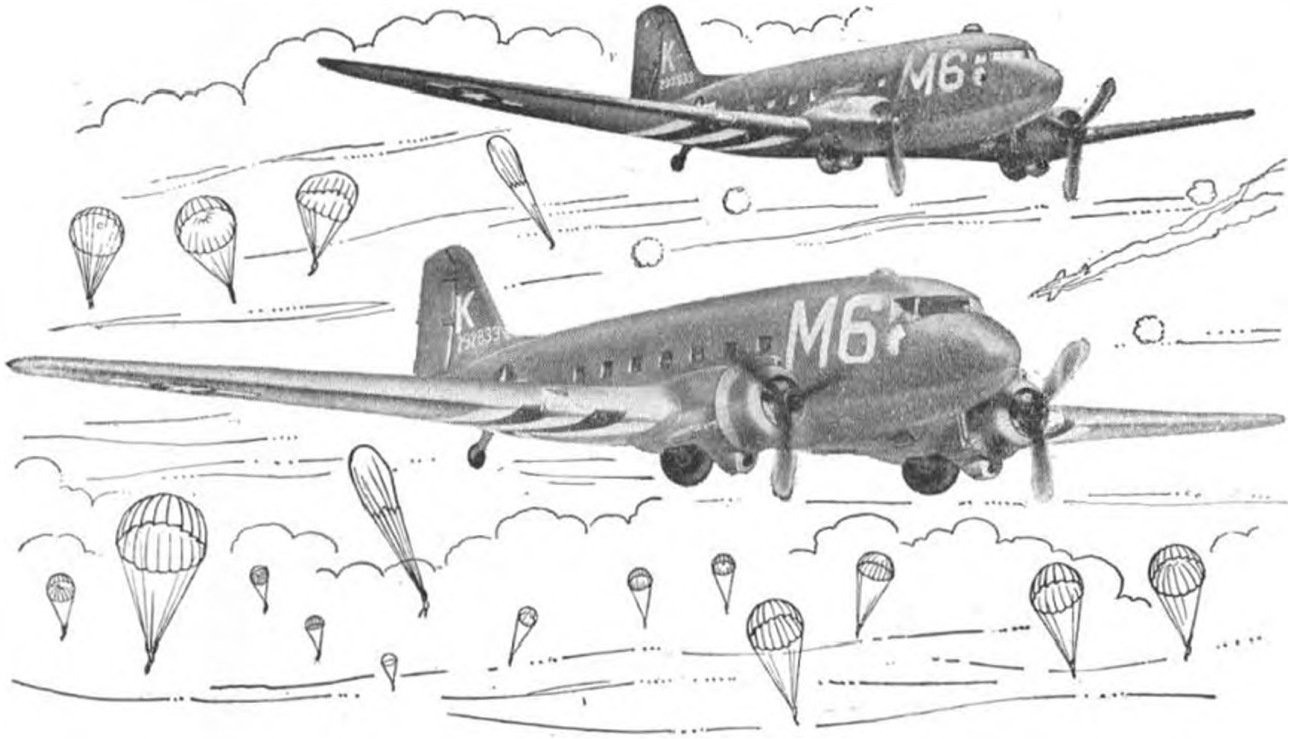

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Believe it or not, the nearer one is the Airfix model of the Douglas C-47 Dakota, 1/72nd scale (Kit 6/-). Behind it is a picture of the real thing.

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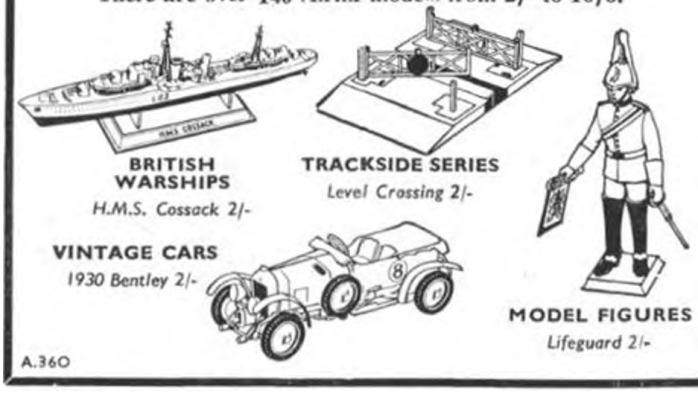

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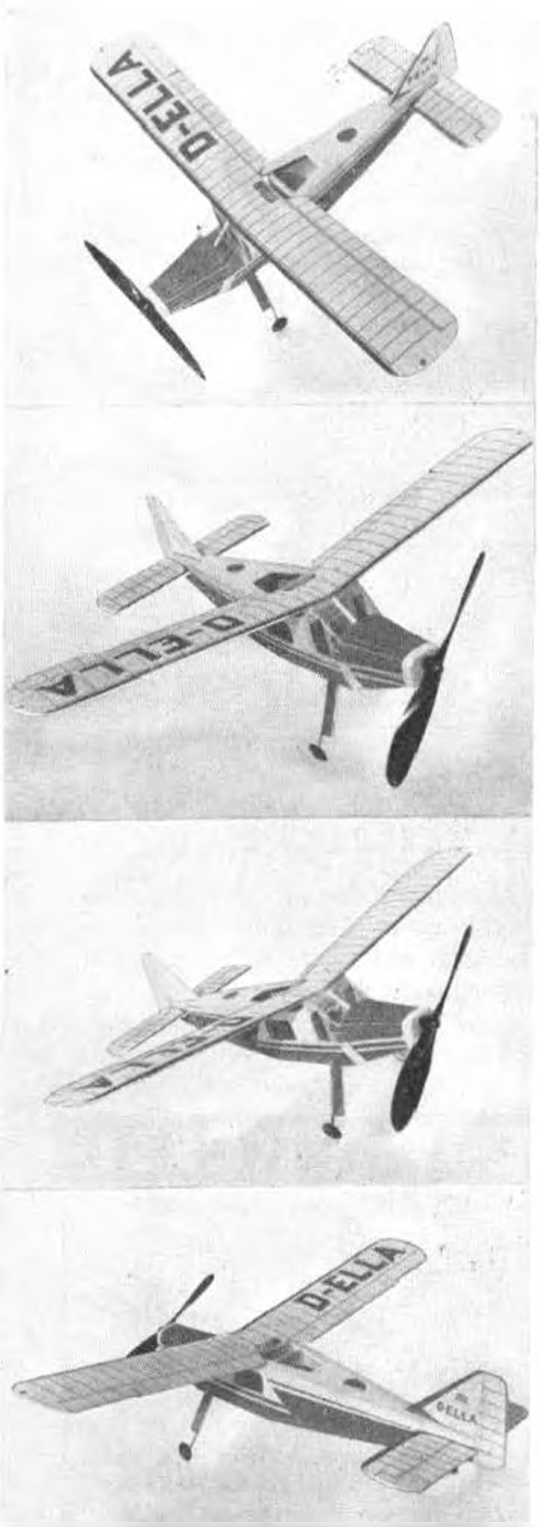

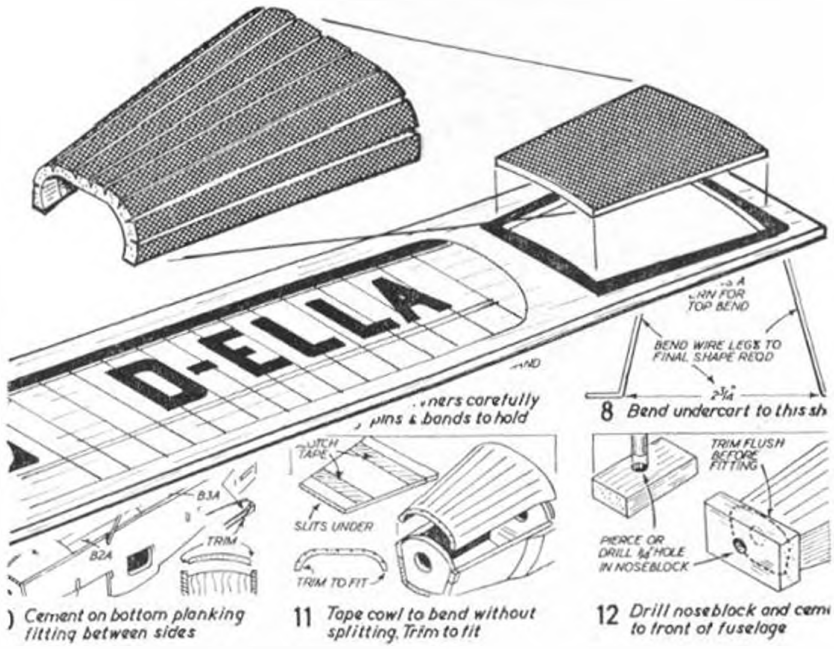

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10 Mk II R/C	1.0	.061	.12	74/-	—	—	—	—	—	36–42	—
10 Mk II W/C	1.0	.061	.12	83/10	For marine models						
15 Mk II	1.5	.09	.15†	63/-	42–48	44–60	28–36	24–30	24–42	42–48	
15 Mk II R/C	1.5	.09	.15†	75/9	—	—	—	—	—	42–48	48–54
15 Mk II W/C	1.5	.09	.15†	85/8	For marine models						
25 Standard	2.4	.147	.20	70/10	48–54	48–66	30–40	30–36	30–48	45–60	—
25 W/C	2.4	.147	.20	92/1	For marine models						
35 Standard	3.9	.21	.275	72/10	48–60	48–72	36–45	36	30–54	54–60	—
35 W/C	3.4	.21	.275	93/10	For marine models						
MERCO 29 Stunt	4.9	.29	.55	139.6	—	—	50–60	36–48	50–60	—	—
29 R/C	4.9	.29	.55	152/6	—	—	—	—	—	60–72	54–60
35 Stunt	5.8	.35	over .6	139/6	—	—	54–72	36–48	60–72	—	—
35 R/C	5.8	.35	over .6	152/6	—	—	—	—	—	72–96	60–72

W/C = watercooled marine version, complete with matching flywheel. *† Not incl. P.T. surcharge*

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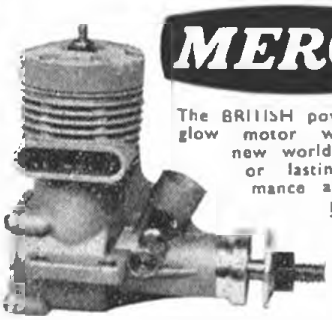

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1.5 volt short reach ...	4/2
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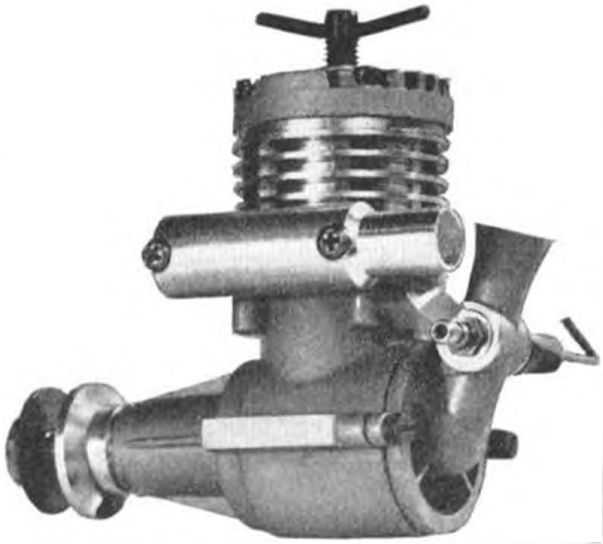

5 times a winner, this fabulous 60" span R/C model is suitable for single control with 2.5-3.5 c.c. diesels or multi-control with 19"-35" glow motors. . . . Combine with the Frog 349 R/C engine for a sure winner! The JACKDAW is the most fully prefabricated model yet offered by a British manufacturer and includes such extras as: pre-formed dural, under-carriage, airwheels and all materials for "full-house" multi-control. **£5.19.9.**

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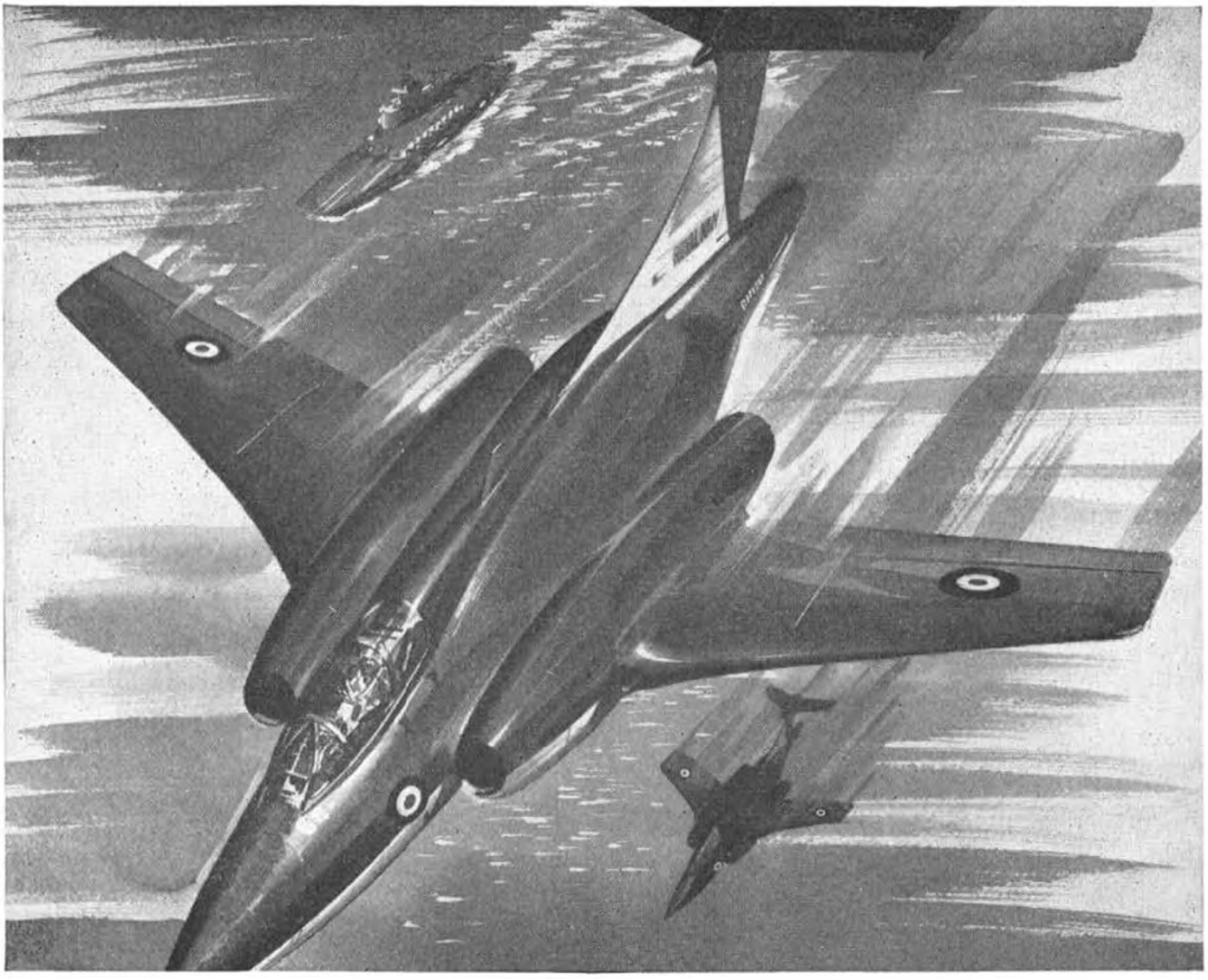

One of the best jobs in the world

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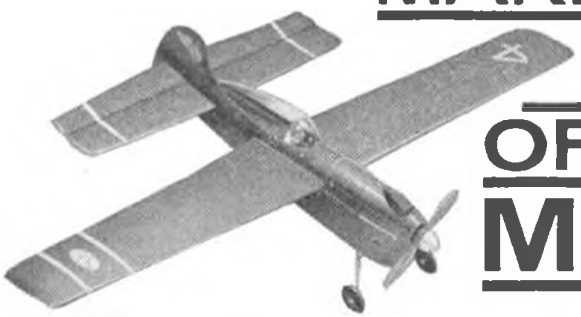
If you really want to get the most from your Modelling, you can't do better than buy and build a Mercury kit. Every Mercury kit offers good design allied to first class materials, and hence real value for money. Ask to see a Mercury kit in YOUR local Model Shop.



F.A.I. Team Racer. A new design by Sid. McGoun to the latest international Team Racing formula. All balsa kit for simplicity of building and ruggedness of construction. For 2.5 c.c. racing diesels.

All the models below are C/L designs for 1—1.5 c.c. diesels.

MARVIN Semi scale cabin stunt model for 1—1.5 c.c. motors with a fine performance. Wing area 175 sq. ins.

19/3

PICADOR flying wing with cabin type fuselage. For stunt and combat training. Span 24". Area 154 sq. in.

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Me. 109 flying scale model. Fully prefabricated kit. Bent wire parts. A good flier.

28/6

¼A Team Racer. A sturdy little model which can be recommended to beginners. All balsa-construction.

15/3

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17/6

MIDGE. Speed model for 1—1.5 c.c. engines. One-time British record holder.

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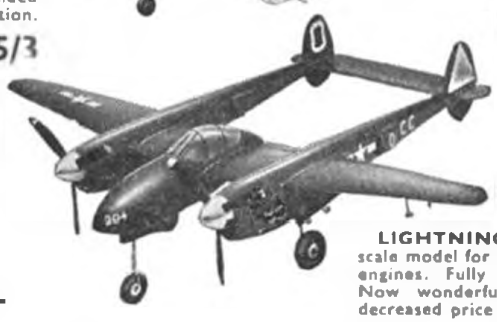

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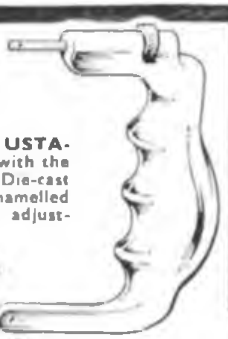
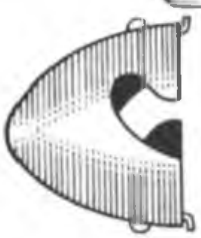
LIGHTNING. A beautiful scale model for two 1 or 1.5 c.c. engines. Fully pre-fabbed kit. Now wonderful value at the decreased price of 45/-.



The famous **AJUSTA-LYNE** Handle, with the non-slip grip. Die-cast body stove enamelled red. Line length adjustment.

6/6



Mercury Metal spinners. Aluminium body with steel fixing plate. Very simple to fit.

1¼" diam **2/11**

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Mercury standard wedge tanks with lapped end joints for that extra strength.

small **4/4**
medium **5/3**
large **6/5**

Ask your local stockist for a copy of the latest Mercury illustrated leaflet, with full details of all Mercury kits, fuels and accessories as well as F.R. Radio-control Components.

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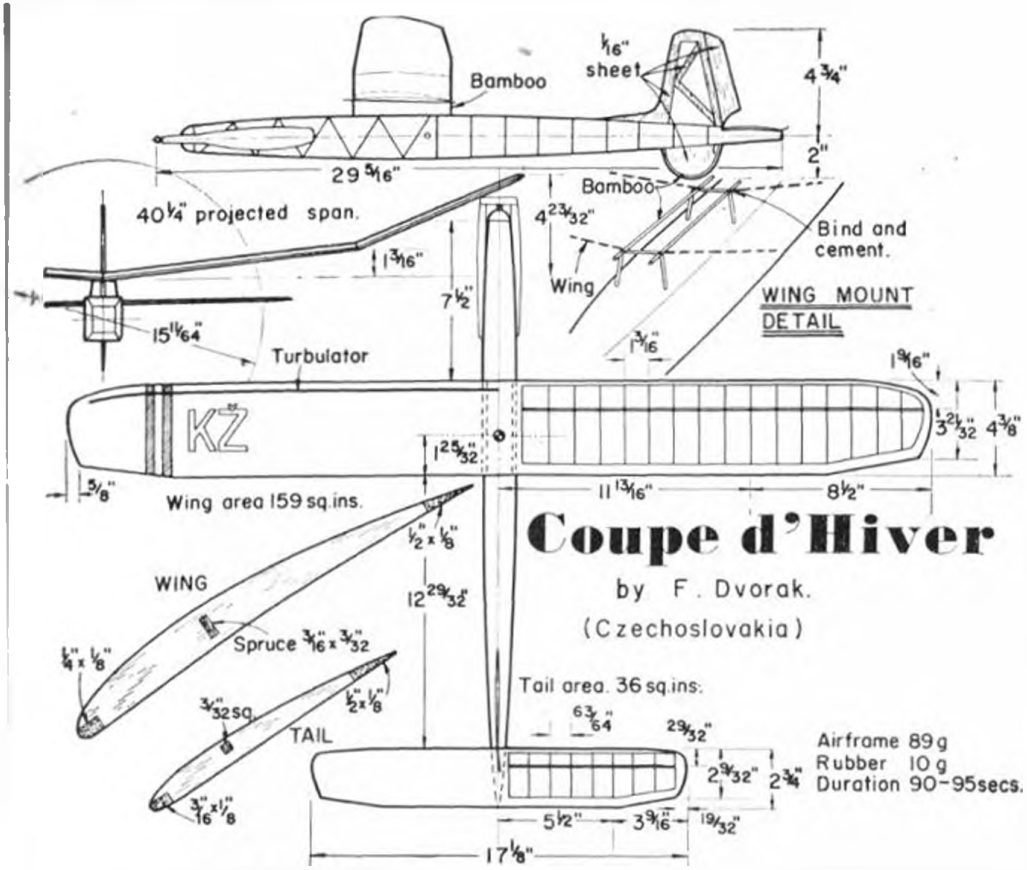


Heard at the Hangar Doors

Entente Cordiale

WE HAD A FEELING that our choice of a rubber model to the *Coupe d'Hiver* spec: as a give-away plan in December issue was to be a happy one. It seems to have met with the most encouraging response and one club (Woking and D.M.A.C.) have already announced that they will be including the class in a 1962 Open Rally.

Specially pleasing is our ability to announce an Anglo-French Challenge which will take place this spring, with the sponsorship of AEROMODELLER and our friends across the channel, *Le Modele Reduit d'Avion*. This too, is anticipated as the first of many such happy events and to start the ball rolling early, the first Coupe d'Hiver International will be a postal contest.

By agreement with Maurice Bayet, who was founder of the class 21 years back and who is Editor of M.R.A., the first 1962 event will be based upon the best individual score and best team score in three flights of two minute maximum. French entries will be automatically taken from the many decentralised Coupe d'Hiver contests which take place in the winter period from December to March, as organised by the F.N.A. Only the first contest entered will count.

For British entries, the three flights can be made on any one day in the month of March. The day will have to be nominated to a club official, who will certify the performance. Full details will be available on application to the Editorial Offices, and Official entry forms sent, together with local club addresses for the unattached modeller. There will be no entry fee; but a stamped, addressed envelope should be sent for the information.

Two fine trophies, the "A/M-M.R.A." for leading individuals and the "Coupe de la Manche" for the Nation producing best three scores will be awarded for regular annual compeittion. In this way, we hope we shall be providing some encouragement for the small field flyer, who does not enter other than club contests.

The Coupe d'Hiver class was described in our December, 1961, issue, and a very successful Czech design is seen above.

F.A.I. News

Official minutes of the November C.I.A.M. meeting have now been distributed to National Aero Clubs and enable us to enlarge upon the advance news.

In order to clarify eligibility of a flight within a set round, the following is to be added to the *Code Sportif*, Article 3.7.1. "When the contest is run in rounds, the timing of the model must be commenced before the end of that round for that flight to be included in that round" . . . in other words, let it go before the red flare goes off to signal the end of the round.

The Flying Scale rules committee is formed by: C. Milani (G. Britain), R. Cizek (Czech.), A. Trzcinski (Poland), a nominee from the U.S.S.R. and Leroy Weber Jr. (U.S.A.), who is secretary. They are to formulate rules for universal use and application to free flight, radio control and control line classes, but the contests are not to be considered as yet for World Championships.

Other sub-committees elected for service in 1962 are:—

Free Flight	*Control line*	*Radio Control*
R. Nyvarinen (*Finland*)	D. J. Arraiza Goni (*Spain*)	C. S. Rushbrooke (*N.Z.*)
R. Cerny (*Czech.*)	G. Barthel (*Italy*)	H. Trumpheller (*Germany*)
J. Sokolov (*U.S.S.R.*)	M. Bienvenu (*Belgium*)	A. Degen (*Switzerland*)
F. Ehling (*U.S.A.*)	A. L. Aarts (*Holland*)	A. Roussel (*Belgium*)
H. J. Nicholls (*G.B.*) *Secy.*	R. G. Moulton (*G.B.*) *Secy.*	Dr. W. Good (*U.S.A.*) *Secy.*

Considerations of the F/F Committee are the question of standard fuel for free flight as proposed by Finland. The C/L committee is to consider the British proposal for a new team race circle layout offering a double outer ring, one for landing and the other for take-off; the question of the diesel as far as standard fuel speed events are concerned; the illustration of existing aerobatic manoeuvres and of the free choice manoeuvres for 1964. The R/C committee is to provide illustration of the existing manoeuvres.

Interesting points raised during the meeting were: Flaps can be used as a measure of speed control on a glider (as the equivalent of engine control in a power model) for mono control in contests other than World Championships. National Aero Clubs are responsible for the condition of Trophies in their temporary keeping and must have engraving done. The proposed reduction of team race tanks to 5 c.c. (by Czech.) is referred back to all National Aero Clubs for opinion. Indoor contests will be on a basis of six flights with no attempts, the best two flights to count, and a deflecting line allowed to

Near scale Chance-Vought Crusader by G. Franklin of Leicester is a sign of scale r/c interest. Weighs 65 lbs. w.th Orbit 10-channel relayless gear. Transmits, steerable nosewheel and brakes as well as normal control. Span is only 52ins. and root chord 20ins.

prevent collisions though contact should not exceed 5 secs. In R/C, the best two out of three flights will be allowed for the 1962 event as a trial.

K-Factors for the A.M.A. C/L Aerobatic schedule were finalised and approved as follows:—

F.A.I. SCORING FOR THE A.M.A. SCHEDULE (Third flight, for those with over 1,600 points in F.A.I.)

Starting in 1 min. K = 1	Inside Square loop (1) K = 5	Horizontal Square loop (1) K = 8
Take off K = 2	(2) K = 7	(2) K = 10
Reverse wingovers K = 8	Outside Square loop (1) K = 5	Vertical eight (1) K = 4
Inside loop (1) K = 1	(2) K = 7	(2) K = 6
(2) K = 2	Triangular loop (1) K = 6	Hourglass K = 10
(3) K = 3	(2) K = 8	Overhead eight (1) K = 4
Inverted flight K = 2	Horizontal eight (1) K = 3	(2) K = 6
Outside loop (1) K = 1	(2) K = 4	Four-leaf Clover K = 8
(2) K = 2		Landing K = 5
(3) K = 3		

GRAND TOTAL OF TOTAL POSSIBLE POINTS (Equal to F.A.I. score) 1,310.

Scale Radio Control at the Nats

Issue of the 1962 S.M.A.E. contest programme (see page 89) brings a number of changes which require further explanation. Last year, Single control R/C was moved from the Nats to the Northern Gala, and for 1962 it is the turn of Multi to move. There are Multi Channel contests in April and May for team selection, which make up for the change, and in the place of Multi we have the newly introduced scale R/C event which is open to all forms of control.

As the F.A.I. International programme is finalised until 1966, the S.M.A.E. is now in a position to gear its own contest programme according to the principal events of the year. Thus in 1962, the first part of the season carries a concentration of R/C and C/L trials plus open events for free flight duration and at the end of the season, F.A.I. specification contests are introduced in preparation for further selection trials for free flight in the 1963 season.

Other events which have moved in the calendar are the traditional "Openers", the Gamage and Pilcher Cups, and the Womens Cup is now incorporated in the Nats.

S.M.A.E. Dinner & A.G.M.

Best attended of all the Society social functions, the 1962 Dinner, Dance and Prizegiving held at the members restaurant of the London Zoological Society was a great success. Chief guest Air Vice-Marshal B. A. Chacksfield, O.B.E. who is Air Officer Commanding 22 Group, Technical Training Command spoke of the 10,000 young men he had under his command and the capability of modern youth. Aeromodelling is by no means a strange subject to the AVM and he is a keen protagonist for the hobby. Trophies were presented by Mrs. Chacksfield and included a special award to the Spring Park Club, accepted by D. Williamson for their effort in organising the camping site at the Nationals.

Next day was the A.G.M., or should we say, the N. Western Area delegation's inquisition of the Society? Out of this will come a long awaited explanation of many things, not the least being a statement on the Insurance protection offered to members.

Mrs. Chacksfield presents the Arthur Mullett Memorial Trophy for Sportsmanship to Sgt. R. Bott of the All-Ars Jr. Leaders Regt., who played a great part in crowd control at the 1961 Nationals, though they actually came to watch and fly. A.V.M. Chacksfield looks on at left.

Free plan offer

Certain readers are possibly suffering under a doubt at the moment, for they have not received the free plan they sent for following the announcements in our September, October and November issues.

The reason is simple! No less than 20 sent us the required coupon and stamps . . . but failed to place their name and address on the coupon. Need we say that under such circumstances it is impossible for us to effect delivery? In order to fulfil our obligations to these readers, we give herewith the postmarks on envelopes (the only clue we have to their location), and any disappointed reader from these districts should write to us immediately. We shall then check handwriting on both envelopes and clear our files.

Ashford, Kent	Derby
Barnet	Indecipherable— Dorset
Birmingham, A.	Elland
Birmingham, C.H.	Haugesund, Norway
Birmingham, F.	Kings, Norton, Birmingham
Broadstairs	Ossett
Burton-on-Trent	Oakham
Cardiff, A	Pinner
Cardiff, B.	Ryde, Isle of Wight
Croydon	Wolverhampton

No less than 99 readers apparently could not read the simple requirements, and although their coupons gave their name and address, they failed to enclose the requisite stamps. We regret that we had no recourse but to ignore these coupons. (Imagine our feelings when we had to pay excess postage on two of these invalidated coupons . . . they had failed to even stamp their envelopes!)

AEROMODELLING IN OTHER COUNTRIES

Royal Air Force in

ADEN Protectorate

described by Cpl/Tech. T. Hill

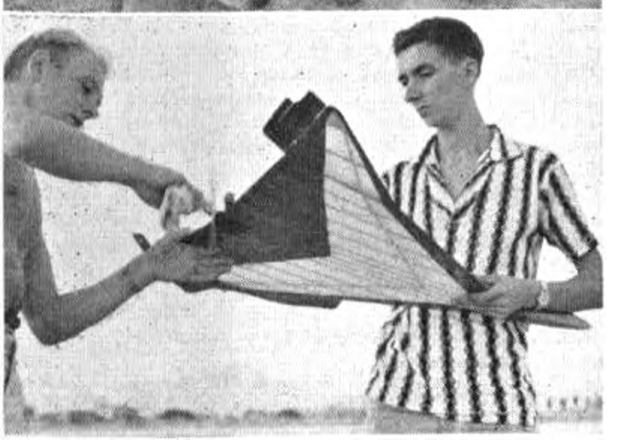
Author with modified APS Calamity Jane in Service colours, outside clubhouse at right. Deserted Control Tower at flying field (left) Below, top to bottom are Sgt. Whitby's neat Brooks' Biplane from A.P.S. plans with a Taplin Twin for multi radio control. Pink and grey colour scheme. Next, stripped for action over the sand, SAC Biddick winds his rubber job, outside clubhouse. Bottom: A.P.S. Delta I with SAC Reid and LAC Hubbard holding while Mills .75 is started.

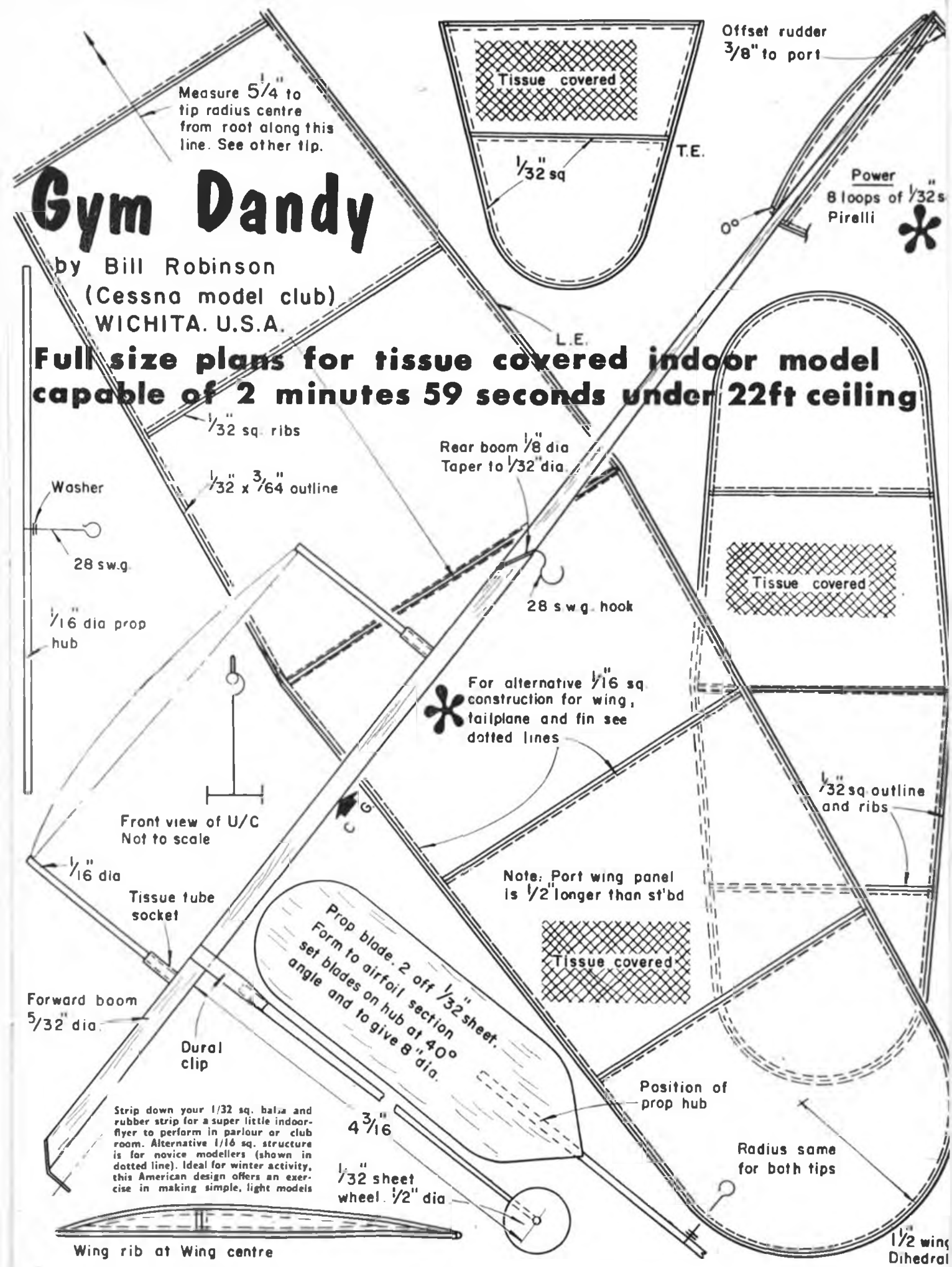
WORK STARTED ON the Khormaksar Clubroom during the early summer of 1959 (see picture in September 1959 issue). Built and designed by club members from two De Havilland Venom packing cases, it was completed in November 1959 and it is now equipped with three roof fans for cooling and ample electrical points. Latest acquisition is a large refrigerator for cold drink store!

We have an excellent flying circle right outside the club door for control line; but big stunt jobs and free flight are taken to *Sheik Othman*. This is a wartime airfield and has also been civilian airport, about 10 miles in a straight line from Khormaksar but about 20 by road. In the direction of the prevailing wind, we have no distance limits. In other directions it is clear for several miles. The only time the weather can be guaranteed to be calm is in the early morning. On alternate Sundays, transport leaves the clubroom at 5 a.m. arriving at Sheik Othman at first light and flying continues until about 11 a.m. By this time the heat is so intense that no one would risk having to walk 5 miles or so to recover a model. The sand is too soft for mechanical transport so all recovery is by foot. We have often acquired the help of the helicopter flight in searching for lost models. They seem to enjoy doing it and look upon it as a good exercise. Daily patrols are routine helicopter duty.

With the heat and winds we also get the thermals. It is not an uncommon sight to see huge columns of sand going upwards in really big thermals. Local birds (Kitehawks) are used to our flights, we have had several models attacked. A Keilkraft *Caprice* was well up in a thermal, (no D/T) and as good as lost. Suddenly a kite-hawk swooped on it, caught it by the tailplane in its claws and tried to take it away. When it let go the model stalled out of the thermal and was recovered, with damaged tissue, after a timed flight of 12 minutes. On another occasion we had a small power job taken up an extra 50 feet or so by a kitehawk. We were going to ask for a ruling on this as it was in a contest, but decided on a re-fly. These kitehawks have a span of up to 6 ft.

Competitions we held during holiday periods to avoid clashing with work. There are two excellent local model shops who often donate two prizes each for club comps. These are usually an engine and kit. Not many clubs can boast of having an O.S. Max 35 and 2½ c.c. stunt kit as first and second prize for combat and O.S. 15 and engine timer as 1st and 2nd for free flight in a club comp, but it is a regular thing here. The shops will get anything we ask them to order so you can see we are well catered for—and cheaply too—with no purchase tax worries! *Thinking of joining the R.A.F?*




Gym Dandy
by Bill Robinson
(Cessna model club)
WICHITA. U.S.A.
Full size plans for tissue covered indoor model capable of 2 minutes 59 seconds under 22ft ceiling
Measure 5 1/4" to tip radius centre from root along this line. See other tip.
Tissue covered
T.E.
1/32" sq
Offset rudder 3/8" to port
Power
8 loops of 1/32"s
Pirelli
0°
L.E.
1/32" sq. ribs
1/32" x 3/64" outline
Rear boom 1/8" dia
Taper to 1/32" dia.
Washer
28 s.w.g.
28 s.w.g. hook
1/16" dia prop hub
Tissue covered
For alternative 1/16 sq construction for wing, tailplane and fin see dotted lines
1/32" sq outline and ribs
Front view of U/C
Not to scale
1/16" dia
Tissue tube socket
Note: Port wing panel is 1/2" longer than st'bd
Tissue covered
Prop blade. 2 off 1/32" sheet. Form to airfoil section set blades on hub at 40° angle and to give 8" dia.
Forward boom 5/32" dia.
Dural clip
Position of prop hub
Radius same for both tips
4 3/16"
1/32" sheet wheel. 1/2" dia
Strip down your 1/32 sq. balsa and rubber strip for a super little indoor-flyer to perform in parlour or club room. Alternative 1/16 sq. structure is for novice modellers (shown in dotted line). Ideal for winter activity, this American design offers an exercise in making simple, light models
Wing rib at Wing centre
1 1/2 wing Dihedral

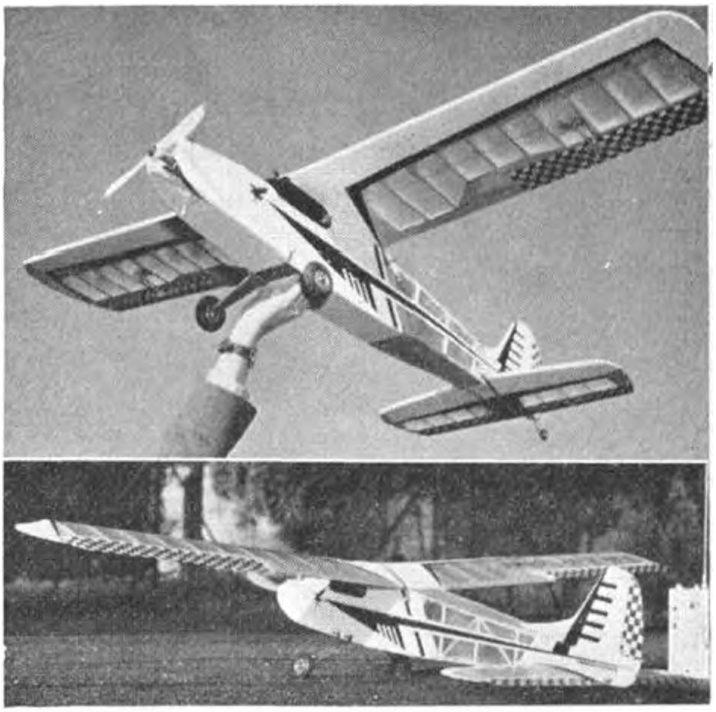
OVER THE WAVES

KIT & EQUIPMENT REVIEW FOR R/C ENTHUSIASTS

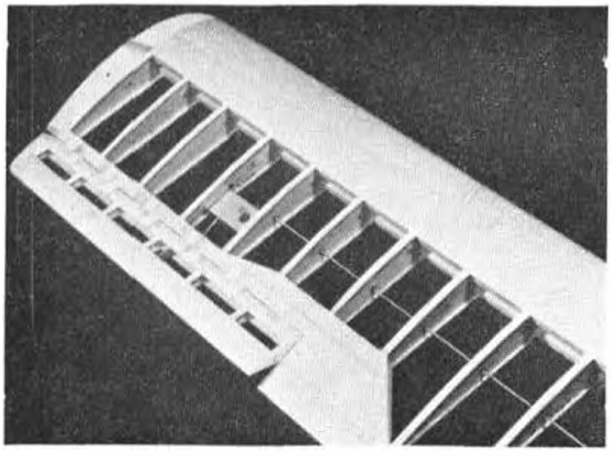
GOOD RADIO MODELS are specialist designs. It is not the right approach to take a simple free flight model, and equip it with radio, expecting success, for in most cases disappointment will result. A successful design is the **Frog Jackdaw**, which, in the hands of Stewart Uwins won several competitions in the rudder only class during 1961. Mr. Uwins is a well known and accomplished R/C flier, but even the best pilot cannot do well if the model he flies does not match his skill. International Model Aircraft took quite a risk, since the Jackdaw was entered in competition during its development stage, thus tested in the full glare of the public eye. Had the Jackdaw not been a success, it would have been quite a blot on I.M.A.'s reputation.

Aesthetically, the Jackdaw has a superficial resemblance to the Uproar, not surprising perhaps in view of Stewart Uwins' association with the latter. Admittedly the Jackdaw has a cabin, but by drawing a line from the top of the engine bay to the front of the wing seat, the nose section takes on the resemblance of that of the larger design. Similarly the fin is a cleaned up, more rounded arrangement. The structure also follows the general layout of Uproar. Fuselage sides are filled in with balsa as far back as the wing trailing edge position, with open, diagonally braced sides aft. All this serves to illustrate the background of experience that has gone into its design. The kit has many die-cut components in both balsa and ply. All the ribs are thus prepared, likewise the balsa and ply fuselage formers. In fact, other than longerons, spacers, spars and dowels which are accepted to be hand cut by the builder plus those little oddments, everything is die-cut or pre-shaped. A good supply of hardware, nuts, bolts etc. is provided in a sealed polythene bag together with all parts, including polythene bottle for the 2 oz. fuel tank. The pre-formed dural u/c and a pair of 2½in. Veco wheels are included.

If you are using the exact gear shown on the plan you can expect little trouble, all the thinking is done, but this will not always be the case and the builder will have to formulate his own distribution of equipment in the fuselage with regard to the designed balance point



At heading are two views of our completed test "Jackdaw" resplendent in Black, White and Orange with Black and White chequered silk control surfaces. Below is our strengthened aileron construction mentioned in text.



of the completed model. This is the whole point at issue, for naturally an incorrectly balanced model will not perform as desired. If anything aim for slight noseheaviness, which is permissible, whereas tailheaviness spells disaster, and should be avoided like the plague. Remember too that the C.G. can move rearwards as much as 1 in. during the covering and doping stage and some allowance will have to be made. All this appraisal of layout is most important before beginning construction, since it may necessitate repositioning auxiliary bulkheads.

All radio models are tailored to equipment since one cannot modify the shape of radio components, so slight deviations may have to be made in the construction of your Jackdaw, but in doing so, be careful to avoid any weakening of the structure as a result. Construction is described admirably in the printed instructions provided with the kit and on the plan. Our model, equipped with ailerons, was strengthened around the inboard of the aileron positions top and bottom with 1/16 in. sheet which can be seen in the picture. Covering is best in silk or nylon, either of which has very good strength to weight ratio. Though it takes longer to cover, than with tissue, the effort is well worthwhile.

Six Channel Radio

The **Min-X** 6 channel is the radio set we are using in the Jackdaw, and the wiring harness was described last month. Transmitter, receiver and separate relay pack all have attractive gold anodised metal cases. The Transmitter case is 16 s.w.g. metal housing two B101 67½ v. (135v.) H.T., an AD4 L.T. and auxiliary U11 type-batteries. Radio components are layed out on a horizontally mounted printed circuit baseboard. On it are three valves, a 1U4, a 3A5 and a huge (comparatively) 3D4, a 26.995 crystal being incorporated in our example. There are three double throw spring biased centre off switches to key the six signals and these are of the finest quality, smooth in operation, requiring only light thumb pressure to move the toggles. The six pots for adjusting the six tones are mounted in the top of the case, the adjustment heads protruding through to the outside, each sporting a screw-on dome shaped metal cover to prevent any

disturbance of the pot once set correctly. One does not therefore have to remove the back of the transmitter to tune in the tones to the reed unit. Interesting feature is the aerial coil, a square coil in etched circuit form. One thing that must be criticised however is the accompanying instruction sheet which really presumes previous experience. Not that the Min-X set is alone in this respect. Manufacturer's instructions in the majority of cases tend to be delightfully vague and frankly it is just not good enough for the novice. If a fellow spends so much money on a set he expects to be told just exactly how it works and how to use it. If you tell a chap what makes a thing tick, he is much less likely to pull it apart to find out for himself, causing damage in the process. Actually the instructions are intended for all Min-X multi channel transmitters but the layout of the non-simultaneous six channel set is quite different to the 8, 10, and 12 channel simultaneous units to which, practically all references are made. In fact at one point the directions are quite inaccurate for in the section on tuning, the oscillator adjusting slug is identified as being mounted horizontally and having a red dot for identification, whereas it is in fact in a vertical attitude with a yellow dot. Correspondingly, the ceramic trimmer capacitor should in fact have a yellow dot, but has none, and although referred to in the instructions as being adjustable, it is locked with solder. We sincerely feel it a great pity that so fine an example of workmanship should be let down by a set of duplicated instructions. Presentation of the simplified harness last month was the result of deciphering two different circuits and should do much to clear the air.

The receiver is in two parts, the receiver proper and reed unit, with the relays in a separate box. Reason for this is that one thus possesses a flexible unit which can be used with different relay packs for varying control combinations, or with relayless power amplified servos. It also has the very real asset of less weight concentrated in one unit. The receiver weighs 3½ ozs. and measures 2¼ in. x 1 1/16 in. x 2/ 9/16 in. It is all transistorised, working off a 6.25 volts pack of 500 DKZ DEAC nickel cadmium accumulators which also supply the power for the servos. A picture of the Rx appeared in our December 1961 feature.

The separate relay pack contains six Deans Relays of low resistance and smoothing capacitors on etched circuit board. The relay switching contacts are not wired up, this being left of the operator. The case measures 3 in. by 1⅛ in. x 1/16 in. and weighs 4 ozs.

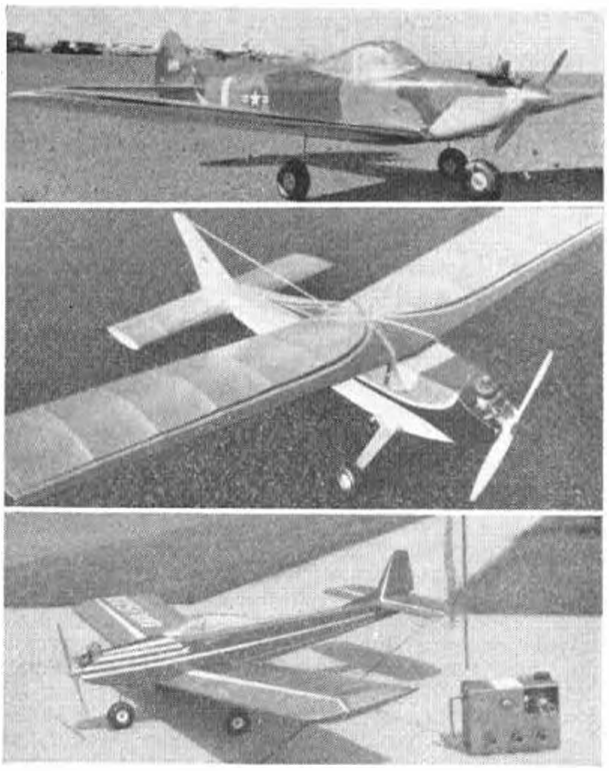
New items

Of interest to the experimenter is a new handbook by Bernards Publishers Ltd., **"Transistor Circuits for Radio Controlled Models"** by Howard Boys, well known radio modeller. This 64 page book size 9¼ in. by 7¼ in. contains circuits, descriptions and diagrams for 32 different items. The contents open with simple subjects like the discourse of the exact function of the transistor, the transistor tester and field strength meters, to interesting subjects such as tuning fork stabilised tone generators and triple simultaneous proportional equipment. The book costs 7s. 6d. and is worthwhile for home constructors.

Harold deBolt provides some news from U.S.A. with pictures of his latest creations and productions. Just coming onto the market in his new 42 in. span single channel trainer the Liver Wire **Yankee,** sporty high winger of 336 sq. ins. area. Weight is 24-30 ozs., and the Yankee is designed for 1 c.c. to 1.5 c.c. engines. Intended as an easily assembled trainer this model will doubtless be as popular as all the previous Livewire series.

Live Wire **Viscount** is a low wing multi channel

continued overleaf



Above are the three new De Bolt models, from top to bottom: *Cobra*, *Yankee* and *Viscount*. Space Control proportional transmitter can be seen in the foreground of the bottom picture. Below is a view from the back of the Min-X 6 channel transmitter with the back removed. Auxiliary U 11 battery can be seen behind the valve on the far left hand side and Xtal in front of same. Note the large 3D4 valve, to the right of which is the vertically mounted etched aerial coil and at extreme right, two of the key switches. The domed pots can be seen in the top of the case.

Over the waves (*Continued*)

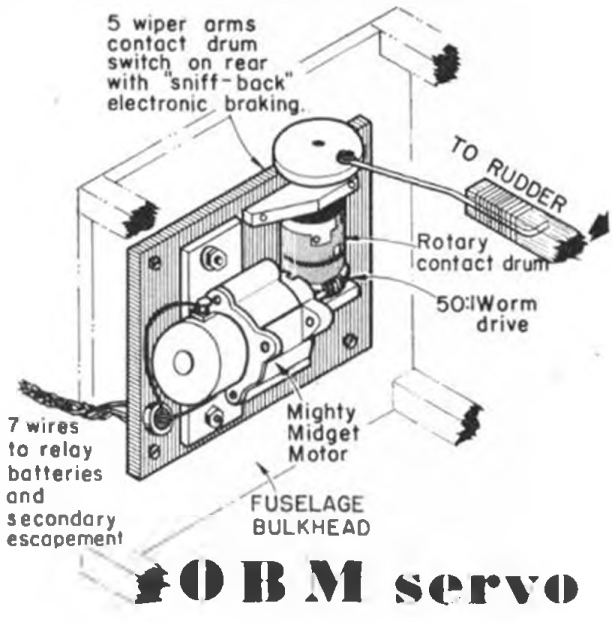
machine of 60 ins. span, smaller than the average model of its type. The object is to cut building time, which Hal claims to have done (by 50 per cent.). One interesting method used to achieve this is to employ full span ailerons made simply from a standard moulded wing trailing edge strip. Naturally the Space Control, quadruple simultaneous proportional R/C set Hal installed saves time since the receiver and servos are all in one box (except aileron servo). The model flies equally well with reed equipment having been tested with such by Ron Chapman from Canada so when it appears after kitting this winter it should be popular. Power of Hal's original was a Super Tigre 35 and it weighed 5½ lbs. for its 720 sq. ins. area wing.

Under development is the Live Wire **Cobra**, semi-scale Bell Airacobra again of 60ins. span and S.T. 35 powered. Prototype used controlaire relayless 10 Superhet radio, but a Space Control equipped example took second place in R/C scale at the 1961 U.S. Nationals for Dick Allen. Wing Area is 660 sq. ins. for a weight of 5½ lbs.

The first of the ultra lightweight all transistorised, relayless receivers working off two pencells (3 volts) we have had the pleasure to *handle* is the **CS 501**, sent in by Roland Scott. It weighs just ¾ oz., having no case, but components are mounted on a printed circuit board measuring only 2 in. by 1½ in. The circuit incoporates four transistors. One Philco T1324, two Philco 2N224 and a 2N213. The receiver will operate with a tone transmitter of modulation frequency of 400—1000 c.p.s., though 700 c.p.s. is optimum. Modulation percentage required is 80—100 per cent. Idle current (carrier off) is 6 m.a., dropping to 4 m.a. (Carrier on), escapement current being 325 m.a. at 3 volts with 8 ohm escapement. Maximum and minimum operating voltages are 3.2 v. and 2.4 v. respectively. An operating temperature range of +20 degrees to 120 degrees F. makes this unit entirely satisfactory for our climate. Price £10 13s. 6d.

Matching Transmitter is the extremely small CS-502 measuring only 7½ in. by 4¾ in. by 2¾ in. The circuit employs a 3A5 valve, the frequency being crystal controlled, (ours at 26,995 m/cs.). A single 2N371 transistor is used to supply the sine wave audio tone (700 c.p.s.) modulating the carrier 90—95 per cent. Battery power is 1½ volts L.T. and two 67½ v. (135 v.) The transmitter costs £13 18s. 6d. Pictures of these in January R.C.M. & E.

Layout of O.B.M. servo can be seen below in mounting position. Manufacturers emphasise that every effort should be made to ensure a perfectly flat mounting against a bulkhead. Provides selective compound action, with "quick blip" contacts for second actuator.



Franklin Bros. expanding hub wheelbrake with hub dismantled, reveals mechanism. Two shoes are seen prised open by cam. This is the best brake of its kind we have yet seen and will take some beating for price and quality.

A new Mini Servo announced by the **O.B.M.** company, is for single channel, built round the popular Mighty Midget motor. Four pencells provide the power with 3 v. drive, 1.5 v. for "Sniff Back" braking and power for extra escapement to engine control. There is no fear of the servo overrunning a position for its system of reverse polarity switching in that event, causes the motor to "Sniff Back". Current drain when moving to position is 250 m.a., the servo weighing only 2¼ ozs. Physical dimensions are 2¾ in. by 2 in. by 1¼ in. Five wipers make contact with the switching drum to give the control movement desired, the worm gear reduction to which is 50:1. Those interested who require a more detailed report should refer to the November 1961 edition of *Radio Control Models*. Price is 59s. 6d.

Geoff Franklin of Leicester, well known as a multi flyer, announces availability of a very neat and beautifully machined **Hub Brake**, with sponge rubber wheels. The brake assembly plate is Allen Screwed to the u/c axle, and on it are two rubber lined brake shoes. The internal expanding brake is actuated by a lever on the outside of the plate which prises the crescent shaped brake shoes apart to make contact with the side of the hollow hub just as on any motor-cycle. The brake shoes are spring centred. Wheels are available in 2½ in. and 3½ in. diameter sizes and cost 70s. per pair, though singles can be obtained price 37s. 6d. The effectiveness of this unit can be gauged by the claim from the manufacturer that it is possible to run an engine in a model at full revs without the braked model moving. Actuation of the brake should be by either down elevator trim or by full down elevator and it should be a great asset to those lucky enough to operate from runways.

Also offered is a **Steerable Nosewheel Unit** with twin 10 s.w.g. wire coiled spring legs. Again it is a very neatly manufactured item being simple to apply to an airframe, having great durability and is quite light. Price is 37s. 6d. and spare legs can be obtained at 3s. per pair.

Armchair Aeronautics

. . . at the beginning

LES PETITS AEROPLANES by G. Houard. Librairie Aeronautique, Paris. 48 pages illustrated. 5 x 8¼ Centimes—in 1909.

We make a strict exception to our policy of only reviewing latest publications when we bring to light this 52 year old manual on Kites and experimental models. It is a gem, found for us by C.I.A.M. President Hans Justus Meier whilst in Paris for the last F.A.I. meeting. Models were based upon the Wright Biplane, the Antoinette and Bleriot, but indicated a remarkable degree of forethought. Helicopters were not neglected and the method of launching a model *Diabolo* style to give an extra twist to the airscrew, might yet have a modern application. This is a treasure for anyone keen on the history of aeromodelling, and a revelation to those to think it all happened in the last 20 years.

Lighter than air

THE HISTORY OF AIRSHIPS by Basil Clarke, Herbert Jenkins, 3 Duke of York St., London. 194 pages, illustrated, 5½ x 8½ ins. 21s.

Dogged by tragedy, the story of the gas filled airship has not been blessed with commercial success. In this history, the author reveals a happier side, and one which will be new to many students of aviation history. Well written, and concluding with an excellent bibliography of other references which inspire one to find out even more about lighter-than-air craft, the book opens with descriptions of the earliest balloons and takes one through to an eye witness account of underwater *Polaris* firings, observed from a U.S. Navy ZPG.2. "Blimp". It makes fascinating reading.

Hobby handbook

AEROMODELLING by Ray Malmstrom, Arco Publications, London, 168 pages illustrated. 4¼ x 7½ ins. 12s. 6d.

Ray's at it again with his particular ability to put the story of the hobby over to younger folk. Actual size plans are difficult to break down to 3½ x 5½ ins. units but he manages it in six pages with a melee of overlappery. The book takes the novice from early days through to unusual types such as ducted fans, helicopters and ornithopters. Each chapter is a good guide to a particular phase of aeromodelling, and the author's 43 detailed sketches add the equivalent of many thousands of extra explanatory words. If anyone asked us to recommend an easy to understand, general guide which covers almost every aspect of our hobby, then this would be the choice. The author's many years of standing in front of the class and educating Britain's rising generations stands him in very good stead when it comes to putting over a technical story in simple language.

Set completed

WARPLANES OF THE SECOND WORLD WAR, FIGHTERS Vol. Four by William Green, MacDonald, 16 Maddox St., London, W.1. 208 pages illustrated. 4¾ x 5¼ ins. 9s. 6d.

Covering aircraft produced in the U.S.A., and Yugoslavia (on only five of the many pages), this completes the set of pocket size reference volumes that are invaluable to modellers and aviation enthusiasts alike. Drawings and excellent selection of photographs have made each of the four books a "rare-bird" seekers paradise and this last, bright blue jacketed one is no exception in quantity or quality. How about the gull winged, twin boom pusher Vultee XP-54 for flying scale? Or a racer based on the Bell XP-77? These are but two of many inspiring references which are amply described in detail. Type histories are always fascinating, and of the many in this book, we find that of the Mustang origin, one of special interest.

Airborne

WHERE NO BIRDS FLY by Philip Wills, G. Newnes, London. 142 pages, illustrated, 5½ x 8½ ins. 21s.

It is not easy to convey the spirit of flight into words, nor the excitements and frustrations of competition, but Philip Wills carries the reader right into his sailplane cockpit in this book and leaves one sparked with an enthusiasm for full size gliding. It also detours into a little story behind the management of Slingsby Sailplanes and its future. If you are considering one of the many excellent gliding holidays this year, this book will provide a guide, from first flights through to International contests, written lucidly by the Grand Old Man of Gliding.

Not too late

THE AEROPLANE DIARY, 7s. 3d.

Aircraft data, equivalent tables, a six language vocabulary of aeronautical terms and a complete list of British Aeronautical Organisations (including the S.M.A.E. we are pleased to see) plus historical dates and other references are all included in this excellent 1962 Diary.

Q & A

YOUR QUESTIONS ANSWERED

DEAR SIR,

I recently purchased a plan of the TOPSCORE from your Plans Service and have been unable to obtain the DURAL required. Can you help me by letting me know where I can get it and its approximate price.

Taunton. P. S. COLE.

Messrs. J. Smith and Sons, 42-54 St. John's Sq., London, E.C.1 are most helpful in supply of non-ferrous materials. A telephone call to Clerkenwell 1277 Dept. 2 will find Mr. A. Judge who can advise on metal grades and estimate cost for remittance. Orders may be phoned and collected or mailed. Dural, NS4, aluminium sheet or tube is held in vast stock. Modellers can use many of the offcuts and since metal is sold by weight it is better to seek advice before ordering.

DEAR SIR,

The state of the management of the rules governing model aircraft in this country is shocking. It seems that about once a season a committee meets to change the rules "just to break the monotony". Take the case of a fellow clubman who had just bought an ETA 15 and decided to build a team racer for it. His cash was pretty low and it took him about three months to get it finished and he was all prepared to go to a comp, (after much practise) when someone informed him that the so called "governing body" had just changed the specification. When he checked up on his 'plane he found that the wing area was insufficient and also that the fuselage cross sectional-area at the cockpit was also insufficient.

How long are aeromodellers going to stand for this nonsense, for not only is it stupid and unnecessary but it dissuades newcomers to the hobby from entering serious competition flying and as I have also stated, is a waste of money, materials and time.

It is about time aeromodellers joined together to stop this unnecessary rule changing.

Hartlepool. E. C. STANTON.

From the tone of your letter it is obvious that your club is completely out of touch with the governing body for Aeromodelling in G. Britain,—the S.M.A.E., 19 Park Lane, London, W.1.

Rules (particularly those for C.L) are only changed as necessary for reasons of development or safety. Alterations are first suggested at Club levels through Area Committees to the S.M.A.E. Council who then consult the appropriate specialist Sub-Committee. Rule changes are made known to members either by issue of a revised rule book or an amendment sheet but not until Area Committees have had opportunity for voicing opinion on sight of a rules change draft. 1963 rules have just been dealt with in this manner and all clubs should be aware of what has happened through their representatives on the Area Committee.

The case in point, concerning 2.5 c.c. T/Racing defeats our understanding. Almost 3 years ago, the 1959 Rule Book amendments announced adoption of the F.A.I. specification for 2.5 c.c. T/R and at the same time, area was increased from 125 to 186 sq. ins. total, fuselage cross-section was increased from 1.6 by 3 ins. to 1.97 by 3.94 ins. This was notified to all members of the S.M.A.E. through Club Secretaries.

Unfortunately the 1960 Rules Book repeated the cancelled specifications but this was corrected by the S.M.A.E. Contest Newsheet. Subsequent additions to the International Class of Team Racer are fuselage cross section to be 6.045 sq. ins. minimum, wheel diameter 1 in., line thickness .0118 ins., (single cable not permitted). These additions were announced by AEROMODELLER *January 1961 P. 13. They were not implemented officially until the Criterium of Aces in Belgium, September 1961 and do not affect S.M.A.E. events until 1962.*

In answer to your final point. It is about time some S.M.A.E. members took advantage of their democratic institution and became more aware of current events.

DEAR SIR,

I am very intrigued by a gliding holiday, sometime next year, but as I am only 16 and live in Sussex I would like to have the names of any gliding clubs in this region,

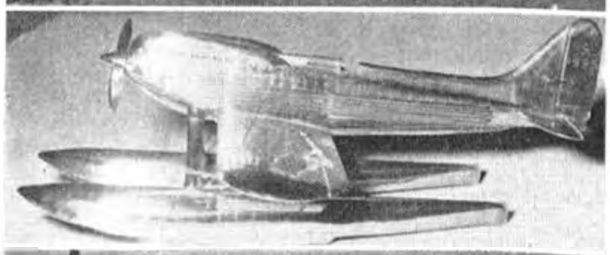
Haywards Heath. T. J. S. BISHOP.

A full list of Gliding Clubs offering holiday courses is available from the British Gliding Association, Londonderry House, 19 Park Lane, London, W.1. Note also the addresses of the Clubs offering their services to Aeromodellers on page 98 of this issue.

SCALE MODEL NEWS

THERE IS A considerable increase of interest in flying and solid scale modelling if we are to judge by the volume of correspondence we receive at our offices. This miscellany of photographs indicates how great is the variety of scale applications.

Top left is G. E. Whitehead of Earby, Lancs. with his Mitchell III bomber, powered by an Elfin 1.49 and an E.D. Bee, and which he scaled up from 1/72nd drawings in volume III *Aircraft of the Fighting Powers*. Flown regularly at Baildon on 35 ft. lines, it is 33¾ in. wing span, weighs 22 ozs., flies at 65 m.p.h. on full power and 40 m.p.h. when cruising on the larger engine. As seen, the model is very neatly camouflaged in 180 Sqdn. R.A.F. insignia.



Flt./Lt. T. E. Dodds of R.A.F. Cosford has a particular yen for the unusual. Photo at top right shows four of his rubber-powered "twins", now six years old and still going strong, all to 1/24th scale and being a Northrop Reporter, B25H Mitchell, P82B twin Mustang and DH Hornet mark III. These models have direct drive motors, furnished cockpits, and sprung undercarriages. The Reporter is the most spectacular flier but all more than justify the effort in their construction. In the background is a diminutive Miles Magister.

The next picture shows his latest effort, a 24 in. span model of the R.C.A.F. Beech C-18 Expeditor as used for a test bed with a turbo prop engine mounted on the nose. This ideal opportunity to "cheat" with a single rubber motor in the fuselage and free wheeling airscrews was too much for Flt./Lt. Dodds to resist.

Even more out of the ordinary are the magnificent models made in brass to the same scale of 1/24th by Les Morgan of Gloucester. The Supermarine S6B and Spitfire are on display at the Royal Aeronautical Society in London. More than 1,000 hours work was involved, including the intricate preparation of detailed templates and hardwood dies for the brass work involved. Both models have movable control surfaces and fuselages made in half shells of 1/64 in. copper sheet, which is riveted in assembly and the cockpit completely furnished as a separate unit with floor and fore and aft bulkheads. The Spitfire has a retractable undercarriage, castoring tail wheel, variable pitch airscrew, working flaps, sprung main legs, sliding hood and hinged rad. shutter. Mr. Morgan is now working on the last of his series, the Gloster Whittle Jet.

Finally, a control-line scale model of the Republic P-47 Thunderbolt made by P. Groos of the Haarlem Club in Holland to 1/15th scale for an E.D. 2.46 racer diesel. The rather high weight of 40 ozs. is well absorbed by the telescopic undercarriage legs, and flight is most realistic. The model was entered at the first International scale event at the *Criterium of Aces* in Belgium last September, and was the Dutch champion C/L scale model for 1961, as can be expected from this realistic view.

Is undercamber necessary ? —by Werner Thies

a fascinating examination of airfoils by German experts, with interesting findings (first published in *Mechanikus*)

• translated by
• Hans Justus Meier

EARLIEST TYPES OF airfoil closely resemble our "modern" model sections of the curved plate variety. In his book on aerodynamics the British scientist F. W. Lanchester tells of the models which he used during 1895-1905 for his experiments, some results of which are still valid today. The majority of his models featured very thin and heavily cambered airfoil sections (*Fig.* 1). Apart from the method of construction, this airfoil shape is, of course, nearly identical with the one advocated by the late Stud: Ing. F. W. Schmitz. His study of model aeronatics, which earned him the Prandtl award, proved the point that at low Re-numbers, *i.e.* at the speed at which models fly, thin and cambered airfoils will yield optimum flight performances (*Fig.* 2).

For almost twenty years, between 1920 and 1940, thick airfoils were the vogue, following the general trend of full-size aircraft of that period. The era of these thick airfoils came to an abrupt end, when Schmitz' book was published. His study offered completely new aspects for the design of model airfoils. Professor Alexander Lippisch, underlined the importance of Schmitz' work by publishing wind tunnel results of the well known Goettingen airfoils M.V.A. 301 and M.V.A. 123, which had been tested during W.W. 1, when Dr. Munk, and Ernst Hückel undertook systematic tests with a family of airfoils in the original small wind tunnel of the Prandtl institute at Goettingen. These results were published in the Technical Reports of the *Flugzeugmeisterei Adlershof*, vol. 1 and 2.

While studying these reports, Lippisch found that these two airfoils would yield extremely high performances if used in model gliders. In fact the introduction of these airfoils resulted in a marked improvement in performance and led to the development of a large number of similar airfoils, like for instance, the Gö 417, Gö 495 and the popular Benedek-developed series.

Now the high performance of relatively thin and highly cambered airfoils results from two properties: (*a*) because of their small nose radius they fly in supercritical conditions even at small Re-numbers (i.e. 50,000—60,000) and (*b*) they achieve high lift coefficients. Since, apart from wing loading, sinking speed is governed by the so-called power factor alone (C_L^3/C_D^2) and as this value achieves its maximum at high lift coefficients, *i.e.* at high angles of attack, and these airfoils appeared to satisfy requirements, systematic research and tests of thin, flat-bottomed airfoils were neglected.

When author Werner Thies compared the airfoil charts of the Go 795 and 796, compiled by G. Muesmann of the Goettingen aerodynamic research institute in 1956/7, with those of the Gö 801, 803 and 804, which had been tested by Schmitz and G. Kraemer, he was shocked to find that the results of the flat based airfoils were much better than those of the under-cambered ones at Re-numbers of 50,000—100,000! This contradicted all previous results, and demanded a more thorough investigation of the matter.

The M.V.A. airfoils were tested at Re-numbers of 74,000—100,000, using rectangular wings of approximately 28½ by 4¾ in. and 31½ by 6¾ in., respectively, at a wind velocity of approximately 29.5 ft./sec. No effort seems to have been made to reduce the turbulence factor of the wind tunnel to a value which would permit airflow conditions approximating those in the free atmosphere. The wind tunnel balance used for measuring the lift and drag forces, (which at these low speeds amount to fractions of an ounce only) was probably the best available at that time, but no doubt was not good enough to ensure exact, valid results. In the two diagrams the polar curve of the Gö 801 airfoil, (which is identical with the *earlier* M.V.A. 301), is compared with the latter's polar found in these early tests. The diagrams, (*Fig.* 3) clearly show that the earlier drag values are approximately *one half* of those found today under much more accurate testing conditions. These drag values do not match until a Re-number of 168,000 is reached. Similar results are obtained when comparing the M.V.A. 123 with the nearly identical airfoil Gö 803, (developed by the well-known aeromodeller Max Hacklinger). Obviously the drag values of the earlier tests are much too low. These extremely low drag values of the M.V.A. airfoils were, however, responsible for the complete lack of interest in further research on flat-bottomed airfoils of medium thickness.

While F. M. Schmitz gave the critical Re-number of the airfoils tested by him as 60,000—80,000 in his book

Fig. 1 Lanchester 1905 model.

Fig. 2 Go 417a polars.

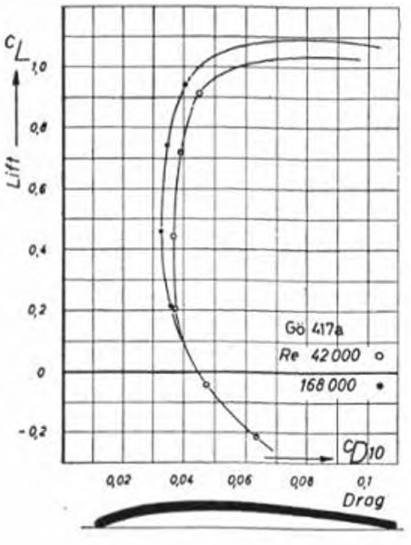
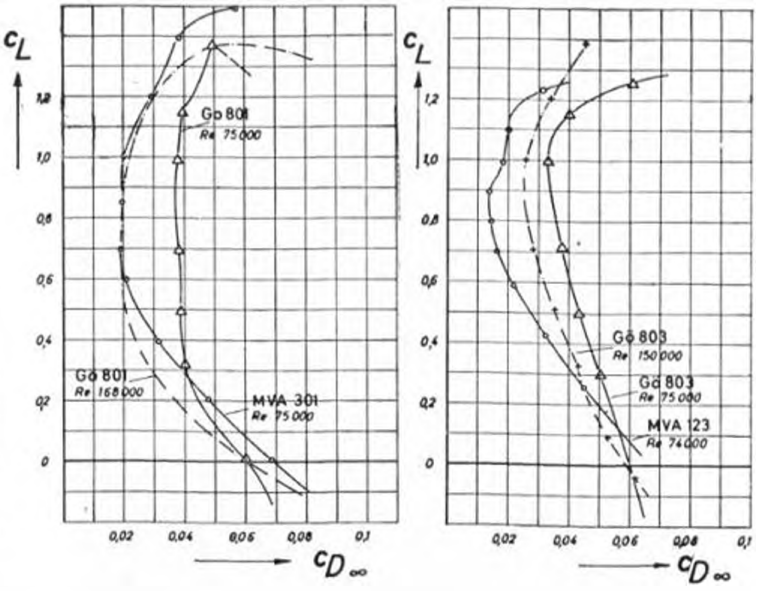


Fig. 3 Comparison of early and recent tests on identical airfoi s.



"*Aerodynamik des Flugmodells*", it was obvious that models equipped with these airfoils flew super-critically at much lower Re-numbers. One explanation for this phenomenon seemed to offer itself: the roughness of the paper covered or balsa planked leading edge or front portion of the wing, protruding leading edges and spars etc. sufficed to induce a supercritical airflow over the top of the airfoil. In his final tests, following suggestions made by Werner Thies and other modellers, F. W. Schmitz put a paper covered model wing (airfoil Gö 801) in the wind tunnel. Results of this test confirmed the expectations, and results are graphically shown in *Fig.* 4, which contains the polars of the Gö 801 airfoil at Re-—75,000 and of a paper covered wing (P.M. 801) at Re 42,000. Over the whole range of practical angles of attack the measured lift and drag forces of both airfoils are very nearly identical. For the ensuing evaluation we may therefore safely assume that the results of airfoils, tested at Re 75,000 in a wind tunnel with low turbulence factor compare reasonably well with those of average model wing having the same or similar airfoil at Re 40,000—50,000 as regards lift and drag values, provided the parameters are reasonably alike.

A few months before his death, F. W. Schmitz succeeded in finishing his tests with the Hacklinger designed Gö 803 airfoil. This section has a maximum thickness of 6 per cent., a mean line camber of 7 per cent. and a nose radius of 1.2 per cent. of the wing chord. Schmitz selected this airfoil because of its popularity in aero-modelling circles and the availability of results of flight tests, made with an A/2 model built by Max Hacklinger himself. This model had been flown both with and without turbulence wire, to study its effect on the critical Re-number. As in the case of the other section these test results show the same characteristic "fanning" of the polar in the critical Re-number range. (*Fig.* 5).

With turbulence wire the critical Re-number is approximately 40,000 for the Gö 803, and 60,000 less turbulator. Performance of the A/2 model equipped with turbulator was measured by Max Hacklinger himself, while results were evaluated by X. F. Wortmann. The model flew at Re40,000, the aspect ratio was 19. In the practical angle-of-attack range; at high lift coefficients of .97 to 1.27, these flight tests showed drag coefficients which were .01 lower than were to be expected from wind tunnel tests, *i.e.* the model flew better than wind tunnel tests had predicted. The measured mean sinking speed was .85 ft./sec., which amounts to a glide time of 192 seconds from a tow launched start with the 164 ft. line, (under still air conditions).

The Gö 795 and Gö 796 Airfoils

During the 1950—1957 period the Gö. 795 of 8 per cent. thickness and the Gö. 796 with 12 per cent. thickness were tested by G. Muesmann in the Goettingen wind tunnel as part of a series of flat bottomed airfoils of different thicknesses (tubulence factor of the tunnel is 1.05). The results for these airfoils and the earlier mentioned ones have been corrected for an aspect ratio of 10, this being a value very often used in aero-modelling, and compiled as polars in *Fig.* 6. A Re-number of 75,000 was chosen, since it can be assumed to represent actual conditions on a model wing at actual model speeds with adquate similarity.

Lowest drag values are offered by the Gö 795. The three other airfoils in turn seem to be nearly identical generally, considering inaccuracies in measurements and airfoil contours, excepting the maximum lift coefficients of the Gö 801 and Gö 803, which are higher than those of the flat bottomed sections.

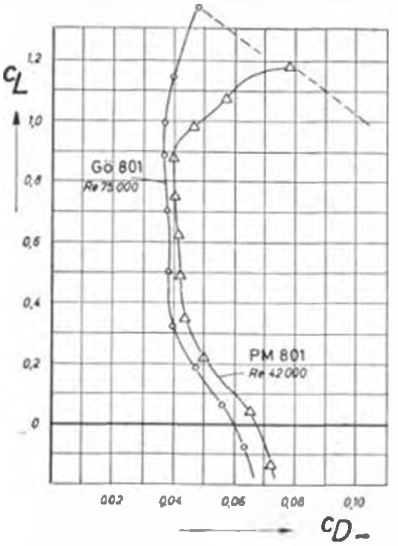
Glide Ratio

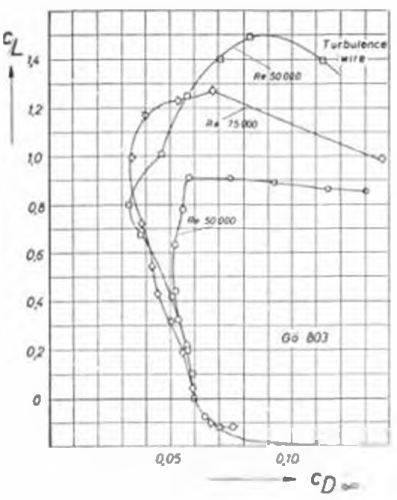
Simplest way to make qualitative studies is to compare the glide ratio of airfoil sections. The glide ratio, which modellers often erroneously call glide angle, is the ratio of the altitude loss to the distance flown. As the result is a fractional value the reciprocal value is commonly used for convenience's sake. This represents the flown distance divided through the altitude loss. Aerodynamically the glide ratio represents the ratio of the drag of either plane or wing to the lift obtained from it, or the ratio of the drag coefficient C_D to the lift coefficient C^L. Hence the reciprocal glide ratio is calculated by dividing the lift coefficient by the drag coefficient in question.

In order to make things easier for the reader, the glide ratios, corrected for aspect ratio 10 model wings, are compiled in *Fig.* 7. At first glance it will be noted that the Gö 795 with the L/D ratio of 20.4 excels, and even the thicker Gö 796 is still much better than the two other airfoils. He who wants a fast model with good penetration should, therefore, select the Gö 795. But he should not overlook the fact that the lift/drag curve of this airfoil has a very pointed contour. In plain words: the optimum glide ratio is restricted to a very limited and narrow range of angles of attack, this in turn requires very careful trimming.

Power Factor

Matters are somewhat different when sinking speed is considered. The lower the rate of sink, the higher will be the duration of the flight. It is the ratio of altitude loss during flight to the latter's duration. From the aero-dynamic point of view, sinking speed is mainly governed by two factors: wing loading and power factor, the latter in this case being defined as the ratio of the square of the drag coefficient and the cube of the lift coefficient. This being again a very small fractional value, the





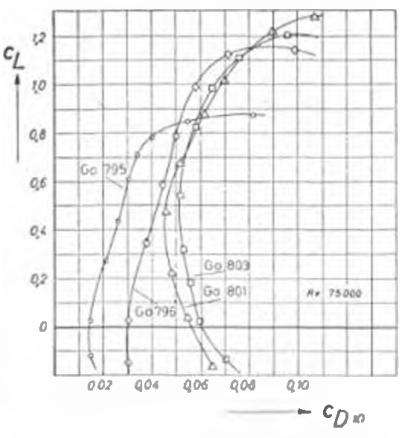
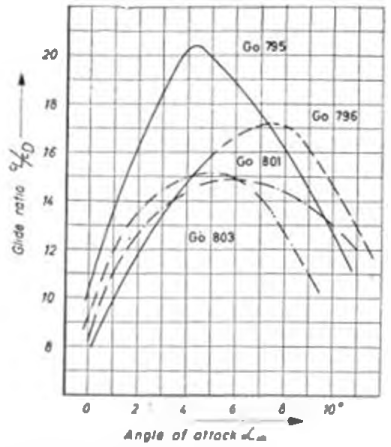
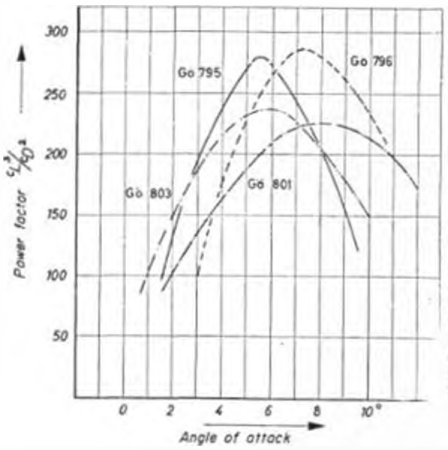


Fig. 4 Far left, Tunnel and paper covered tests compared. Fig. 5 Centre, Flight test polars. Fig. 6 Below, four comparisons, flat base and undercambered.





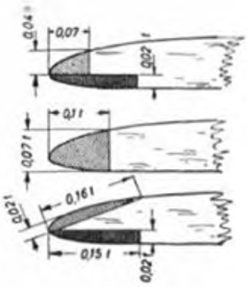


Fig. 7 far left: Glide Ratio Vs Angle of Attack. Fig. 8. Power Factors compared. Fig. 9. Suggested leading edges, with metric dimensions.

reciprocal value C_L^3/C_D^2 is generally used. The larger this reciprocal power factor, the lower will be the sinking speed of the model, the longer will it fly. On evaluation of profile charts one soon discovers that the optimum power factor occurs at higher angles of attack, *i.e* at. higher lift values (*Fig.* 8). This is the reason why one prefers airfoils with relatively high values of C_L max for use in gliders. When one now checks the power factors of the airfoil sections under discussion, the results come as a surprise. For sure enough the best one is not the thin Gö 795, but the thicker Gö 796 with its C_L max of approximately 1.12. Its optimum value is, however, only slightly better than the one for the Gö 795. Models equipped with these airfoil sections should in theory, fly longer. Whether they actually do so can only be proved by actual flight tests.

Boundary Layer

There are two principal airflow conditions, which occur in the boundary layer and both have their distinct advantages and disadvantages. The turbulent boundary layer with its slight vortices is, for example, advantageous because of its ability to transport energy from the adjacent flow to the upper surface of an airfoil; it is thus capable of preventing separation of the airflow by a pressure rise, which takes place near the rear end of an airfoil. In other words; airfoils with turbulent boundary layer over the upper surface of the section attain higher lift coefficients than those where the boundary layer is laminar. Hence one tries to create a turbulent boundary layer over that part of the upper surface, where a pressure rise is bound to occur. If, with very low Re-numbers, turbulence of the boundary layer cannot be induced by the shape of the airfoil itself, then turbulators are used for this purpose (wires, spoilers, vortex generators etc.)

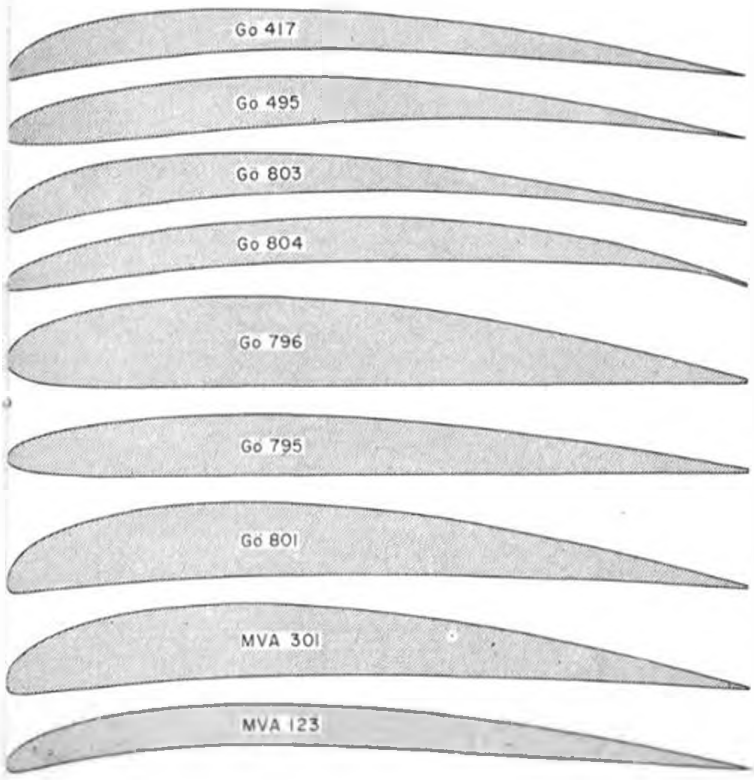
On the bottom rear surface of the airfoil, things are quite different again. Here we do not have a pressure rise to cope with at high angles, in fact the contrary holds true, and the boundary layer is generally in the laminar state. The skin friction of the laminar boundary layer is approximately one half that of the turbulent boundary layer, and is thus very low for the lower contour of the airfoil, unless it is induced to become turbulent through badly finished wing surfaces, corners, ridges (spars, leading edge) etc.

On airfoils with highly concave bottom contours the laminar range is restricted to relatively high angles of attack, say from + 4 deg. upwards, and only then is its effect on the overall drag of the airfoil noticeable. At low angles of attack, separation of the boundary layer must be expected on the bottom of these sections aft of the leading edge, creating a strong tendency to dive. It should be clear that the drag of flat-bottomed airfoils, which at angles of attack as low as 0 degrees still show an extended laminar boundary at the bottom surface, is smaller. Consequently this part of the airfoil should be given its full share of attention (*Fig.* 9). Alexander M. Lippisch once wrote: " . . . *it is very important to know that the bottom part of the model* (*and even a fullsize glider*) *wing is the sacred side. In order to achieve optimum values of L/D* (*lift:drag ratio*) *and sinking speed the bottom part of the wing must be kept as clean and smooth as possible* (*smooth enough to make a fly break its legs on it*)." These words should not require any additional comment.

Flat-bottomed Airfoil Advantages

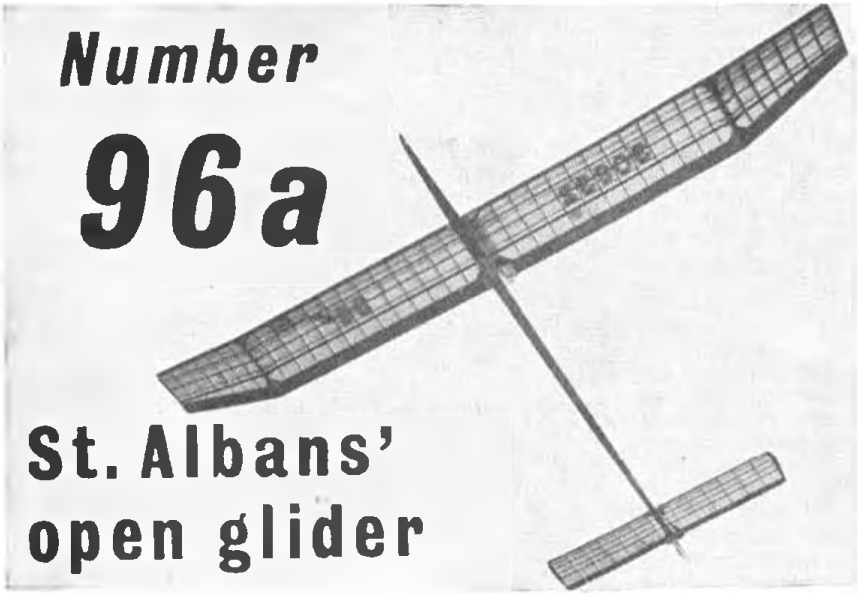
Not only do the Gö 795 and Gö 796 airfoils offer advantages over those with camber, judging from this test data, but they are also much easier to use. Ample proof of the latter characteristic is their general application to elementary models with their simple and robust wing construction. In addition, such wings possess inherent torsional stiffness. There is need to remind anyone of the trouble which cambered sections cause in this respect. The centre of pressure travel is governed by the camber of the meanline of the airfoil. If the camber is small, so is the centre of pressure travel. The airfoils generally used for glider and rubber powered models have mean line cambers of approximately 6 per cent. compared with mere 2.4 per cent. for the Go 795 and 3.7 per cent. for the Gö 796. This means that for a given size of tailplane the moment arm can be safely reduced, which in turn decreases the moment of inertia accordingly. In other words such models will recover still faster from any displacement. *Continued on page 90*

Below: Profiles of airfoils mentioned in text. Ordinates on page 90.



Number 96a

St. Albans' open glider



designed . . .

by the experts of one of the leading clubs

proved . . .

in three contest seasons

easy . . .

to build and fly with simple lines for inexpensive and very quick construction

FULL SIZE COPIES OF THIS 1/6th SCALE REPRODU

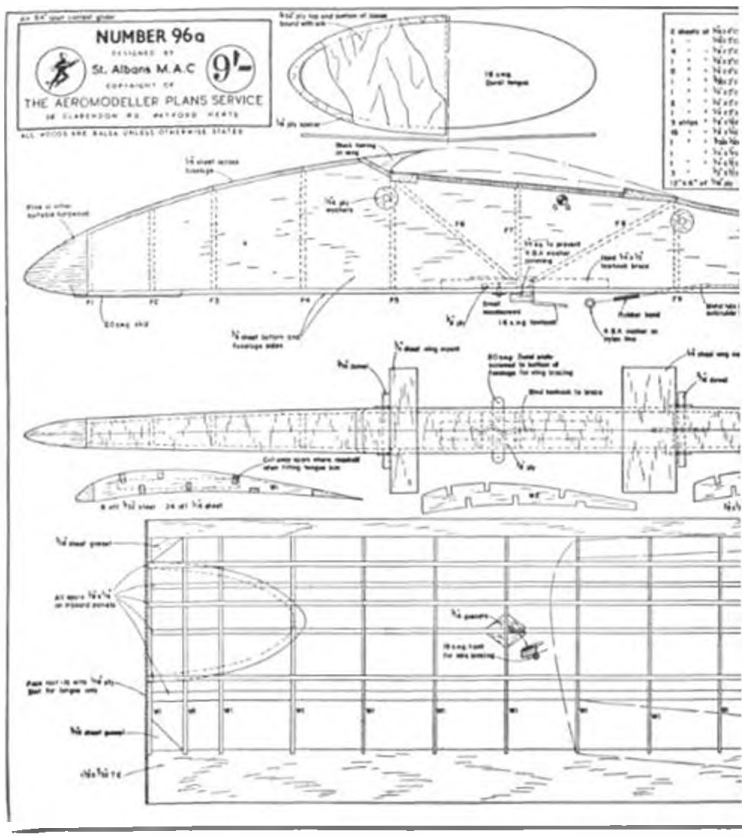
DURING THE LAST ten years, preoccupation of model glider enthusiasts with the A/2 class has tended to leave the large, open class, glider out of favour. Prior to this decade of ascendency of the international class in competition, the Open Glider reigned supreme. Results of the 1961 rallies indicate that the "wheel of progress" has swung full circle and that this type is, once again beginning to command greater interest. Experts such as Jim Baguley and Laurie Barr have used this type in competition for some time, but perhaps the greatest 1961 success story comes from that consortium of experts in the St. Albans M.A.C., B. Cox, J. Simeons, I. Crawshaw, D. Tipper and G. Fuller, (who represent four aircraft companies and a leading model wholesaler) responsible for *Number 96a* presented here. The design has, in the last three seasons, amassed a fine record of achievement, including three 1st places at the South Midland Area Rally and in the "Model Engineer" Cup for 1961 and 1959, 2nd places at the 1959 Devon Rally, and Croydon Slope Soaring Rally, 3rd places at the 1959 Surbiton Gala and 1961 "Model Engineer".

Planned at the St. Albans permanent clubroom, *Number 96a* was originally intended to be a lightweight of around 16 ozs., but subsequent experiments proved the performance of a 20 ozs. example to be superior.

Eight prototypes have flown, all but one having placed high in competition. The last three performed straight from the building board with no adjustment to rigging, weight or turn!

Begin construction with the fuselage, cutting sides from medium $\frac{1}{16}$ in. sheet, 4 in. wide for the nose section. Scarf join the sheet sides around F.10, arranging the joints in opposite directions. Cut F.5 and F.7, again from $\frac{1}{16}$ in. medium sheet and assemble with the fuselage sides. Cut the remaining formers from soft sheet to save weight and cement all but F.5a and F.6a into the fuselage where indicated on the plan. The fuselage bottom is $\frac{1}{16}$ in. medium sheet scarf jointed around F.3 and cemented in place. The $\frac{1}{16}$ in. ply plate is cemented to the floor ahead of F.6 through the top of the fuselage. This is to hold screws for the 20 s.w.g. dural plate wing brace stay, after the completed fuselage is sanded. Bind and cement the formed 16 s.w.g. towhook to a $\frac{1}{16}$ in. by $\frac{1}{16}$ in. hard balsa strip and cement the assembly to the base. Now fit remaining formers F.5a and F.6a then add wing and tailplane rests ensuring that they are at 90 degrees to the fuselage sides. Cement metal tube sleeving for auto-rudder line through the fuselage sides at F.7 and behind F.15 and thread Nylon cord through these tubes, entering the fuselage at F.7 and reappearing at the rear tube. Now sheet the top crossgrain, with $\frac{1}{16}$ in. balsa.

Sand the fin to shape and symmetrical section from $\frac{1}{16}$ in. sheet, separating the rudder and cementing a metal tube to its leading edge. Insert 20 s.w.g. wire hinge pin through the base of the fin, through the rudder tube and up, burying it into the wood above. Cement this assembly to the fuselage, and add the underfin, ensuring that both fin components are vertical to fuselage. Carve pine or hardwood noseblock and attach to F.1, followed by 20 s.w.g. wire nose skid.



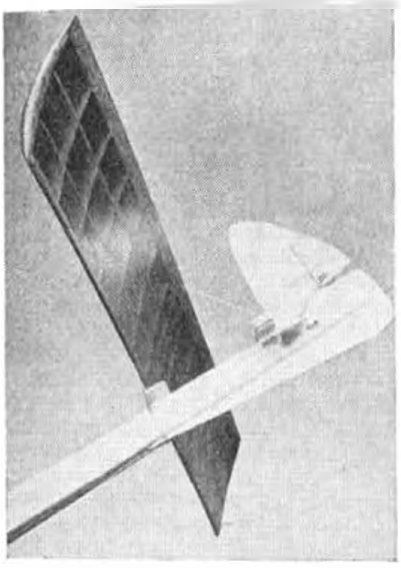
Sand fuselage and cover with lightweight tissue. Fit wing retaining dowels, autorudder and tailplane stops.

Cut the tailplane ribs from quarter grain 1/16 in. sheet balsa. Sand the trailing edge to shape from a ⅜ in. by ¼ in. strip. Notch for ribs and pin to plan, packing up 1/16 in. to allow for camber. With leading edge pinned in place, cement ribs and spars. Sand to fine finish and cover with lightweight tissue. Fit d/t hooks.

All but the centre eight 3/32 in. wing ribs are also cut from quarter grain 1/16 in. sheet. Sand the trailing edge from 1½ in. by ¼ in. strip and notch for ribs. Make up the tongue box from 1/16 in. ply, gluing and binding with silk. Pin leading and trailing edges to plan, tapering leading edge tip from ½ in. sq. to ⅛ in. by 7/16 in. The trailing edge should be packed up ⅛ in. to allow for camber. Cement all ribs in position and face root ribs with 1/16 in. ply. Affix tongue box and inboard spars. (If preferred, the spars for both wing and tail can be added by pinning the spars over the ribs, then notching to fit spars). Where necessary, spars should be relieved at root to accommodate box. Crack wing at dihedral break and apply dihedral on tip panels with 1/16 in. ply braces. Cementing the outboard wing spars and all gussets in place, (including four ply keepers), tip blocks and strut hook, binding latter in place. Sand all over and cover with heavyweight tissue. Finish wing construction by bending the 1/16 in. thick dural wing tongue, ensuring that it fits tightly into the boxes. A loose fit can be taken up with thin paper glued to upper and lower faces.

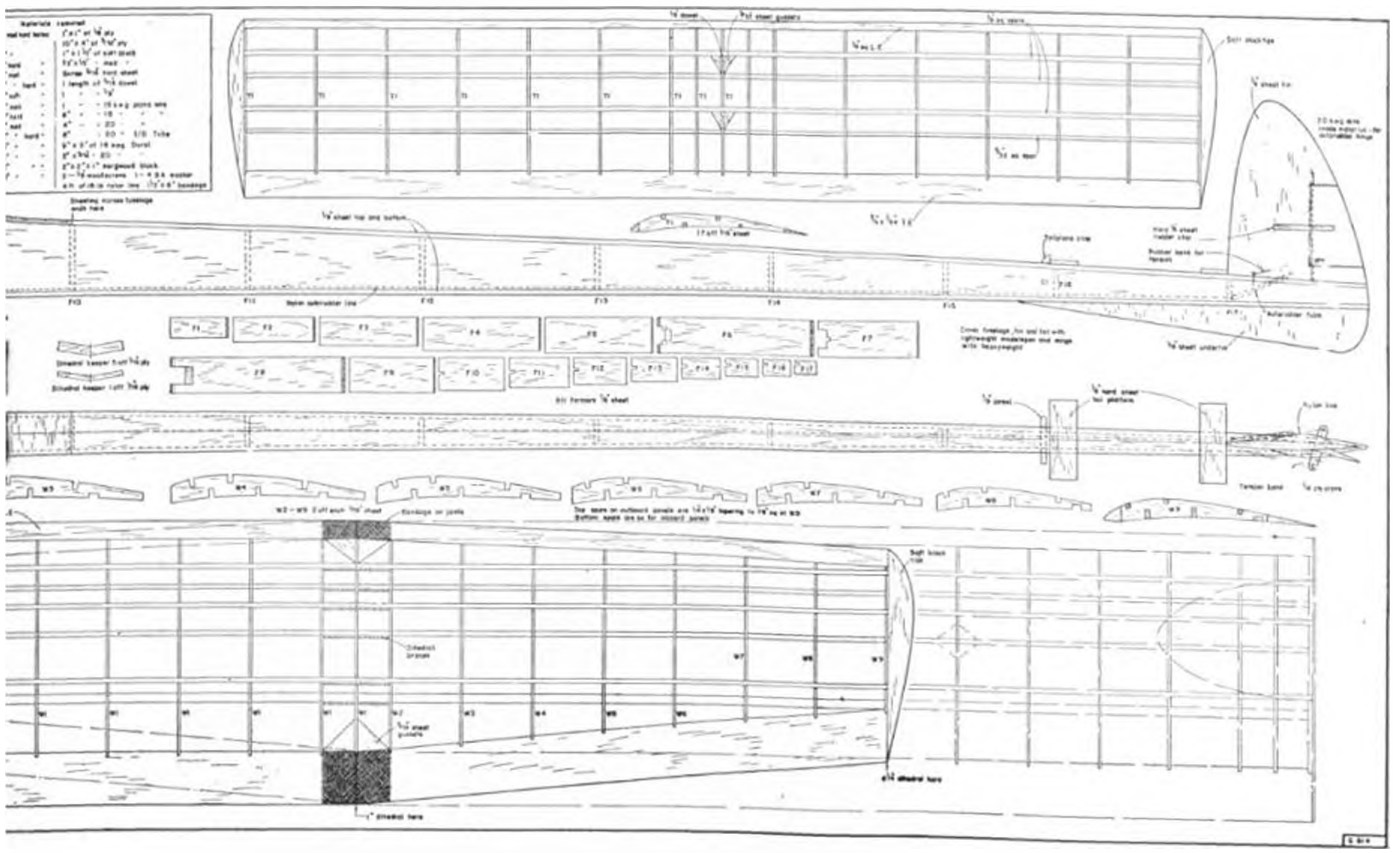
Fully assemble the model, shaping and adjusting the wire dihedral struts for desired dihedral angle. Rig the autorudder assembly, tensioning the rudder with a rubber band and ensuring that the rudder returns to exact neutral position when the nylon auto-rudder is actuated on tow. Add thread dethermaliser tailplane stop and ballast as required to bring the C.G. to desired position as indicated on plan.

If completely true and warp free, the model should fly satisfactorily straight off the board.



Above: St. Albans Clubsters enjoying their spoils at the S.M.A.E. Prizegiving with Cups, Trophies and Certificates — plus the enormous Farrow Shield. They won both the team events for Rubber and Glider, gained first three placings in the team Power contest, but narrowly missed adding that Trophy to their list. *Number* 96a has of course, contributed greatly to their success.
At right: is the tail-tip-up for dethermalising, a vital operation with such a maximum - making design as the *Number* 96a. Note auto-rudder tab set for left turn on the glide.

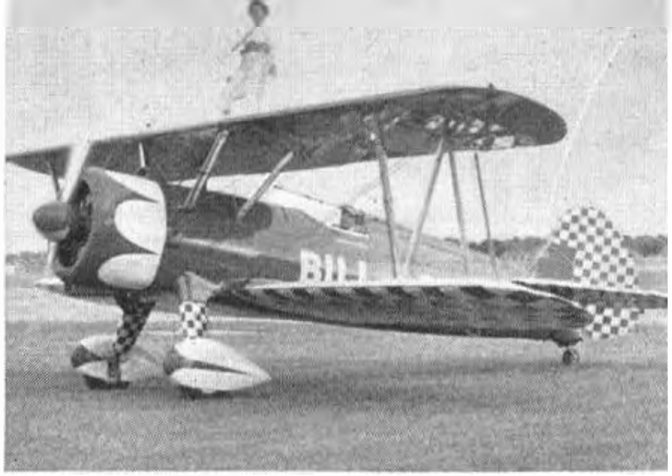
CTION ARE AVAILABLE AS PLAN G.814. PRICE 9/- PLUS 6d. POST FROM AEROMODELLER PLANS SERVICE, 38 CLARENDON ROAD, WATFORD



The Boeing KAYDET

Famous Biplane Number 30 . . .

by G.A.G. Cox



Left: Unmarked PT-13D, note forward exhaust ring. Above: Bill Adams' streamlined and aerobatic version with cowled Wasp Jr engine ready to take wing rider Judy Cole through manouvres. *Dick Stouffer picture.*

ALTHOUGH IT WAS not the last military biplane to be designed and built in America, the Stearman "Kaydet" will be remembered as the last to go into production. It was remarkable too, as the first aircraft to meet the specifications of both Army and Navy; never before had the two services completely reconciled their differences in requirements.

The "Kaydet" was a biplane in the classic American style, with its radial engine (strange that it was never cowled!), minimum upper dihedral and heavy stagger. Also characteristically American were the large cockpits with a high seat position necessitating ample windscreens, long travel undercarriage, and a beautifully smooth exterior and well finished.

Developed from the NS-1 of 1934, the Lycoming-powered PT-13 appeared two years later. Twenty-six machines were delivered to the Army, followed in 1937 by 92 PT-13As with slightly increased power and different instrumentation. Another increase in power distinguished the PT-13B, 255 of which were built in 1940 to meet the demands of an expanding training programme. Six PT-13As were re-engined to become —13Cs. The same 220 h.p. Lycoming was chosen for the PT-13D (Navy N2S-5) of which 1,768 were built, the majority going to the Navy.

The PT-17 series all had Continental engines, and were the most numerous—3,519 of the basic model alone, plus 21 of the -A and -B variants fitted for blind flying and spraying. The Navy equivalents of the PT-17s were the N2S-1 to 4. A few PT-18 and -18As with Jacobs engines completed the picture, except for 300 PT-27BW (Boeing-Wichita) Continental-powered winterized machines with cockpit canopies which were supplied to Canada under the Lend-Lease agreement. Other countries purchasing the "Kaydet" were China, Brazil, Cuba, Bolivia, Colombia, Guatemala, Argentina, Venezuela, Peru, the Dominican Republic and the Phillipines.

Of the enormous total of 10,346 machines manufactured up to February 1945 more than 2,000 are still being used for sport, aerobatic flying and agricultural duties. There is one, registered G-AROY, used for crop-spraying demonstrations in this country; like many others in the United States it has been fitted with a 450 h.p. Wasp Junior—more than twice the original power. Bill Adams, former winner of the Aerobatic Championship in America, flies a similar machine fitted with a cowl and spinner, spats and headrest and resplendent in a scarlet and white colour scheme.

Designed for rapid manufacture and maintenance, the Stearmans had a fuselage and tail assembly of welded chrome-molybdenum steel tube. The fabric covering to the fuselage was supported by light alloy arches and stringers; the cowling panels were of dural. The wings, fabric-covered, had wooden spars and ribs with alloy compression ribs. All struts were metal, and the simple undercarriage assembly could be detached by removing just four bolts.

The writer acknowledges with thanks the generous help given by Mr. H. D. Hollinger of Boeing, Wichita; Mr. Gordon S. Williams of Boeing, Renton and Mr. Harold Krier in the preparation of scale drawings.

Facts and figures

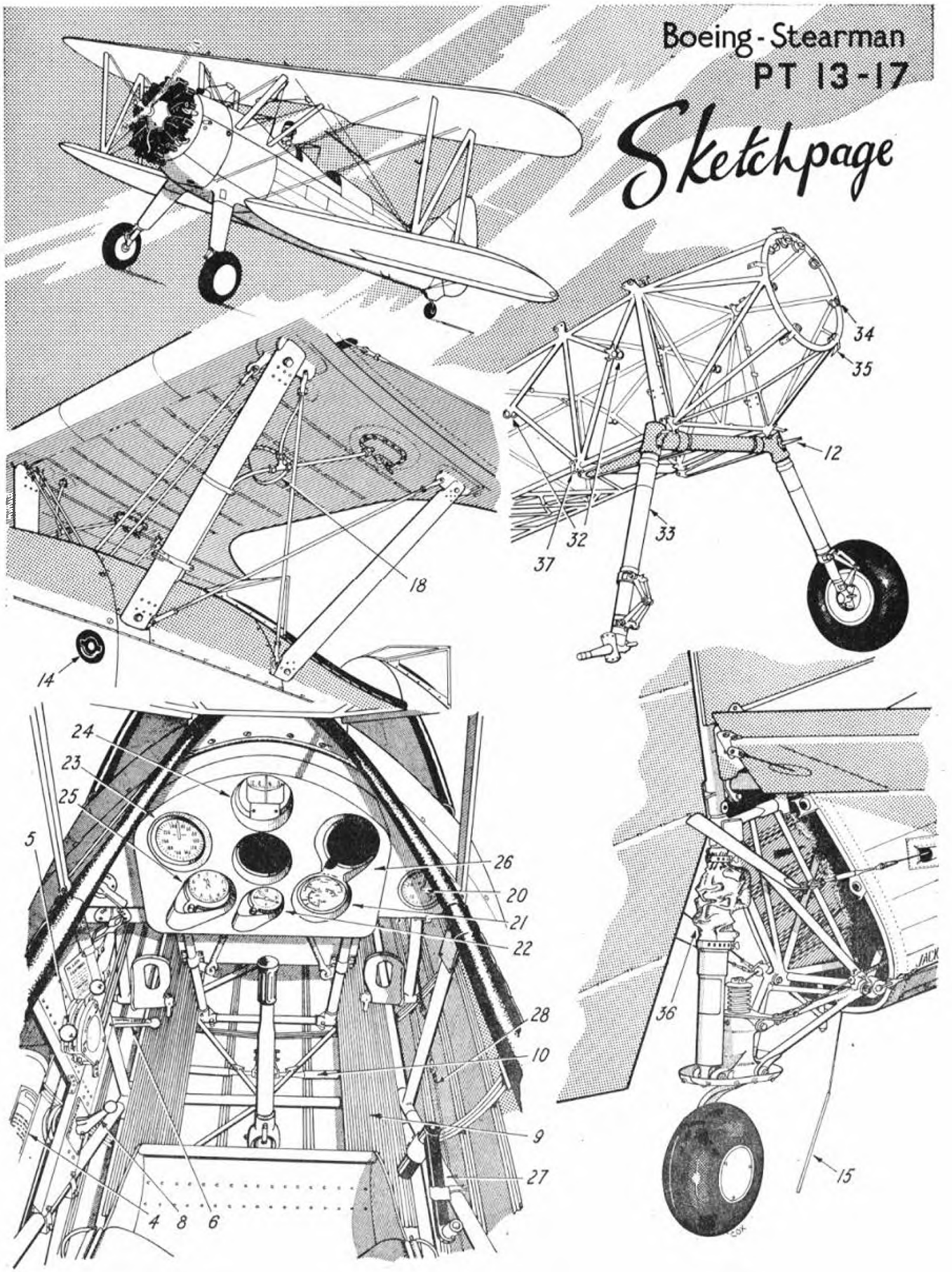
Span—32 ft. 2 in. upper
31 ft. 2 in. lower.
Length—25 ft. 0 in.
Aerofoil—NACA 2213
Chord—5 ft. 0 in.
Incidence—4 degrees upper.
3 degrees lower
Dihedral —½ degree upper.
1½ degrees lower.
Stabilizer incidence— 3 degrees

Maximum weight—2950 lb.
Empty weight—1870 lb.
Max. level speed—125 m.p.h.
Cruising speed—100 m.p.h.
Landing speed—56 m.p.h.
Service ceiling—12,000 ft.

McCauley steel propeller—
dia. 8 ft. 6 in.
Sensenich wood propeller—
dia. 8 ft. 2 in.

Key to Drawing.—1. Firewall. 2. Baggage compartment. 3. Instrument panels. 4. Fire extinguisher. 5. Throttle. 6. Control lock lever. 7. Rudder pedal. 8. Elevator trim. 9. Corrugated heel boards. 10. Link rod to aileron crank. 11. Aileron crank. 12. Step. 13. Petrol filler cap. 14. Oil filler cap. 15. Static discharge rod. 16. Carb. air intake. 17. Mag. switch operating rod. 18. Fuel gauge. 19. Elevator control tube. 20. R.P.M. 21. Oil temp. and press. 22. Clock. 23. A.S.I. 24. Compass. 25. Altimeter. 26. Instrument panel bevelled along sight-lines. 27. Inertia starting handle, rear cockpit only. 28. Rudder cable. 29. Mag. switch. 30. Fuel cock. 31. Front seat. 32. Mounting lugs for pedals. 33. Complete undercart assembly detaches. 34. Engine mounting lugs. 35. Cowling attachment points. 36. Canvas cover. 37. Front spar mounting.

ARMY & NAVY. Blue and yellow PT-17 with rear exhaust collector on Continental engine and serial 732 on vertical rudder strip of Army markings. At right: Line up at the Stearman factory of thirteen N2S-1 Navy primary trainers in bright yellow. *Boeing Airplane Co. pictures.*


Boeing - Stearman
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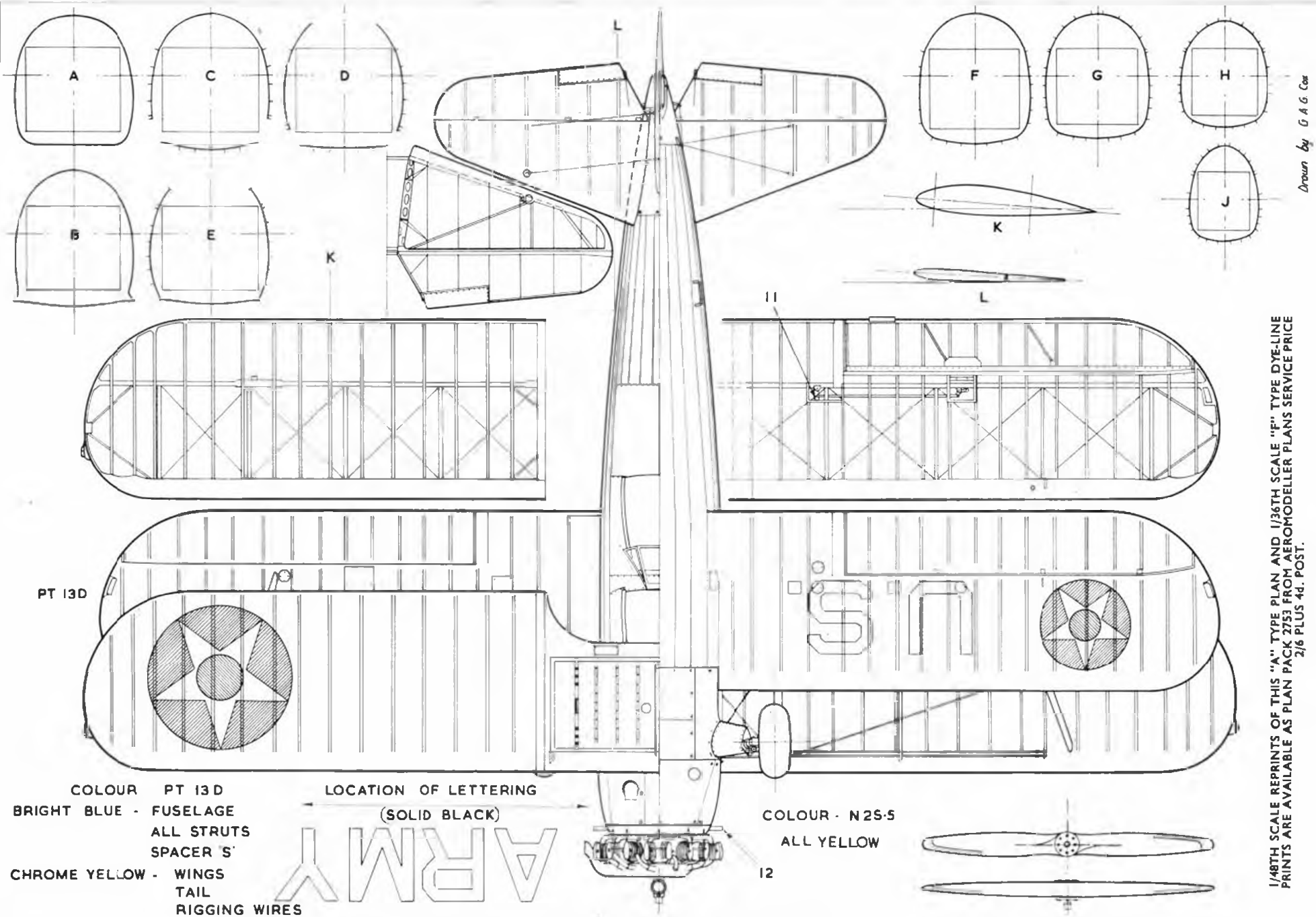


Drawn by G A G Cox

1/48TH SCALE REPRINTS OF THIS "A" TYPE PLAN AND 1/36TH SCALE "F" TYPE DYE-LINE PRINTS ARE AVAILABLE AS PLAN PACK 2753 FROM AEROMODELLER PLANS SERVICE PRICE 2/6 PLUS 4d. POST.

COLOUR PT 13D

BRIGHT BLUE - FUSELAGE
ALL STRUTS
SPACER 'S'

CHROME YELLOW - WINGS
TAIL
RIGGING WIRES
NUMERALS ON FUSELAGE

ALUMINIUM - WHEEL DISCS

LOCATION OF LETTERING
(SOLID BLACK)

ARMY

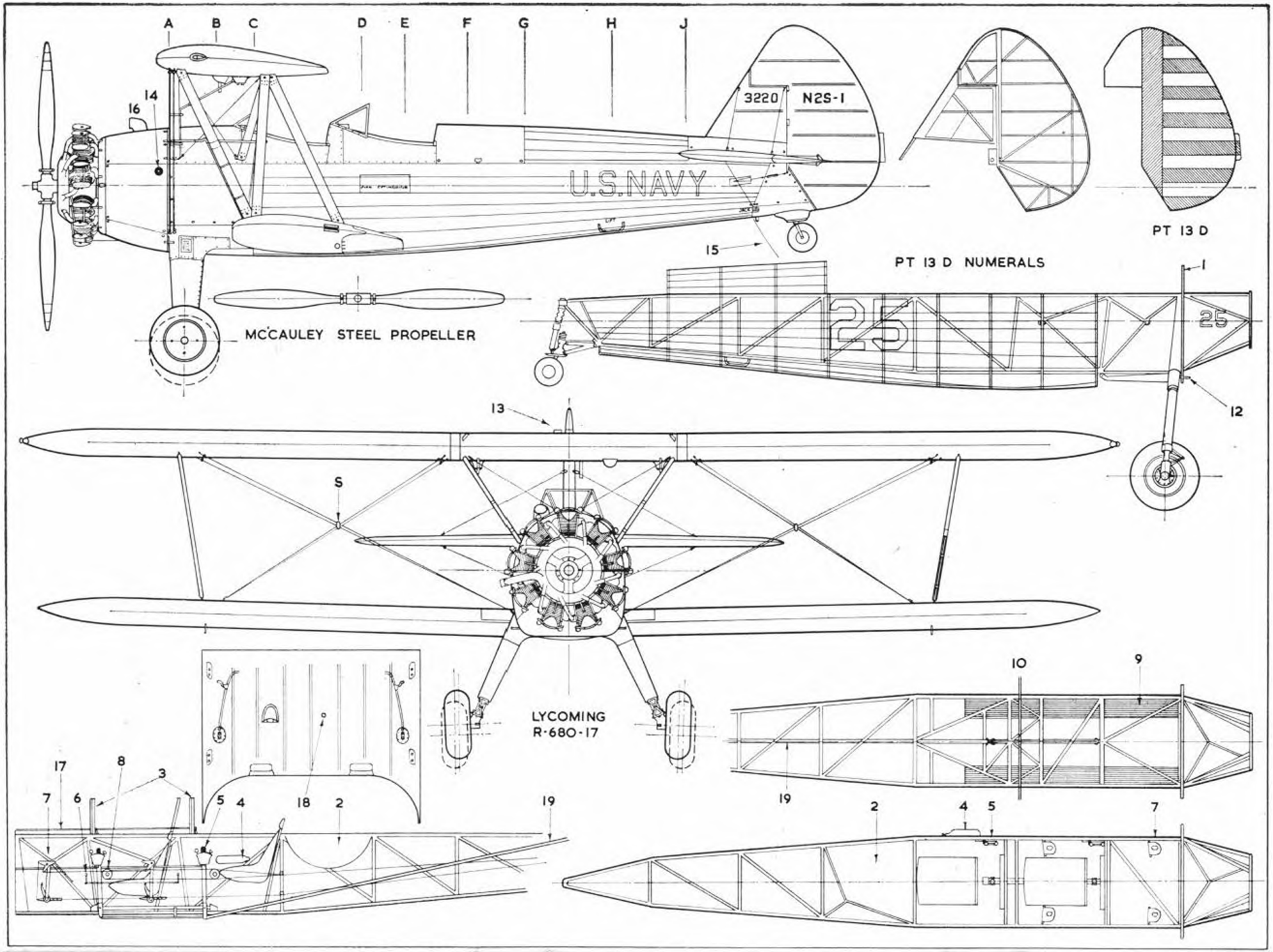
BLACK (BOTH SERVICES) WING WALKS, HANDLES, COCKPIT EDGE PADDING & TAILWHEEL CUFF.

COLOUR - N2S-5
ALL YELLOW

SENSENICH WOODEN PROPELLER

BOEING-STEARMAN PT 13-17-18 N2S-1-2-4-5

FT.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U.S.NAVY
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MC'CAULEY STEEL PROPELLER
PT 13 D
PT 13 D NUMERALS
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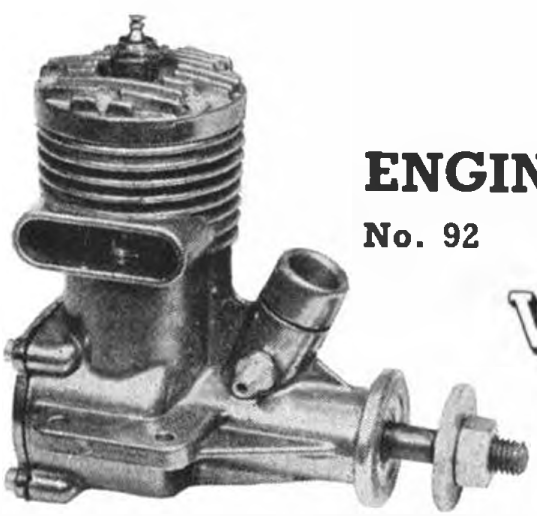


ENGINE ANALYSIS

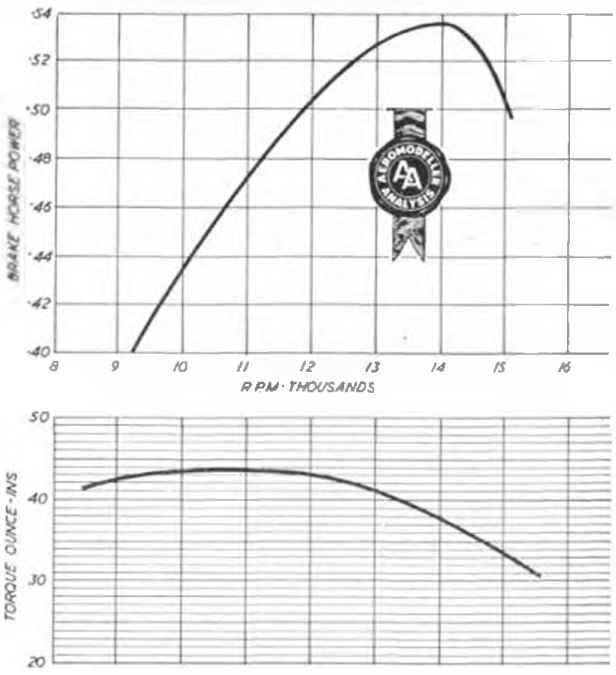
No. 92 **By R. Warring**

VECO 35C

FOLLOWING THE FAMILIAR Veco design layout, the model 35 C is a tough, robust glow motor developing maximum power at somewhat higher r.p.m. than the radio control version, with control line combat application in mind. Like all the other Veco models we have had through our hands the 35 C impresses as soon as it is taken out of its box and general handling characteristics and performance more than live up to expectations. Although a large engine, it is extremely easy to handle and an excellent starter, even on small diameter propellers. Adjustment is not critical and running is consistent at all load speeds.

All Veco engines are manufactured with "temperature controlled clearances." Basically, this means simply that piston and cylinder finishing is carried out under controlled temperature conditions, working to close tolerances, resulting in close and regular fits which should eliminate any necessity for running in. The instructions state that Veco engines do not need bench running for break-in, but do recommend keeping the needle setting slightly rich for the first hour or so's use.

This particular engine received from the production line for test proved the exception to the rule. It was definitely tight—so sticky, in fact, that it was reluctant to two-stroke or even run at all for more than about twenty seconds at first, then slowing down and stopping. It needed the equivalent of something like one or two hours running time to free up completely, running at fairly high speeds. Running at lower speeds with a large diameter propeller and rich mixture produced little improvement. Once freed up, however, the engine could not be faulted as regards starting, handling or consistency of performance.



This initial tightness was confined to the top of the cylinder and a most unusual feature to find on a Veco engine. There was no question of the main bearing being tight. The class of fit adopted by Veco for the crankshaft is what could literally be called "a rattling good fit"—lots of slack but nothing to cause trouble and in point of fact a very good bearing in view of the generous length of shaft. Fit is, however, slack enough for a considerable quantity of fuel to escape via the front end, pumped out of the crankcase—helpful in keeping the bearing cool but wasteful of fuel and also tending to make the engine a rather dirty runner.

Our test measurements did not realise the B.H.P. figure claimed by the manufacturer (.65 B.H.P.) but the figure of .535 B.H.P. at 14,000 is a very reasonable one for a plain bearing motor *without* excessively "doped" fuel and is perfectly adequate for control line stunt and combat work. The 35 C is also most tolerant about fuel setting and tank position, although for combat installations a pressurised feed is recommended by the manufacturers.

An outlet fitting is, in fact, supplied for this purpose, basically a hollow bolt replacing the top left hand screw holding the crankcase back cover in place. The tapped hole for this screw is drilled right through the crankcase casting and opens into the bottom of the transfer passage, thus providing a pressure port which is normally sealed by the cover screw for normal running. With pressurised feed the venturi insert in the intake can be removed, resulting in a measurable improvement in performance at some slight loss of easy starting characteristics. The venturi insert is held in place by the spraybar.

A substantial cast crankcase unit incorporates long and well braced lugs, being carried well forward along the front bearing length. The transfer passage is cast in on the left hand side and the bore machined to take the liner. Although a ridge is left at the bottom of the bore the liner actually seats on a shallow flange machined on its top. It is then held in place by the head attached with six short screws.

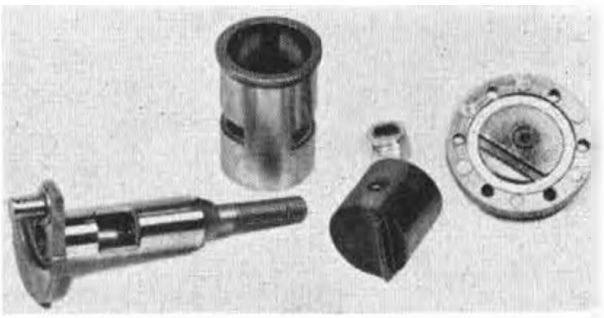
The liner itself is of soft steel, ground externally and honed internally to finish. Liner o/d is .90 in. for a bore of .7845 in. Exhaust and transfer ports are purely rectangular in shape and almost equal in width and depth, the overlapping the exhaust be about 85 per cent. of its depth. The whole liner appears to have been tumbled after initial machining since all sharp edges are rounded off and have the characteristic appearance of this type of treatment or of a cast liner. It is an easy sliding fit in the crankcase unit, but the cast head, which

is machined to match the top of the liner, is quite a tight fit on the liner flange. No gaskets are necessary to seal. The head is of conventional finned pattern with the plug well offset to the exhaust side.

The piston is machined from cast iron with wall thickness reduced to a practical minimum. A fully contained deflector is incorporated. Suitable gudgeon pin bearing area is provided by local thickening—i.e. removing an ovoid section from the top section of the inside of the piston. Gudgeon pin diameter is quite small—only 5/32 in.—and is of the fully floating type, hollow with copper eyelet-type end pads. The connecting rod is of flat section light alloy, machined from solid with a loose fitting bronze bush for the big end bearing.

The crankshaft is machined from steel, hardened and left quite hard and finish ground over the bearing length. Main diameter is a generous .475 in., tapering sharply in front of the bearing to a ¼ in. diameter threaded length. An almost square induction port opens into a 11/32 in. hole in the shaft. The web is cut away and quite heavily counter-balanced, the shaft itself in fact being heavily overbalanced (although not completely offsetting the weight of the reciprocating components).

Main bearing consists of a bronze sleeve, presumably cast in with the crankcase unit and honed to finish. The fit, as mentioned, is very slack, but the bearing surfaces appear true and good with no signs of wear after several hours running. No oilway is provided down the sleeve—nor is one needed with the class of fit employed—but a smaller hole is continued down the crankshaft past the intake port and connects with a small drilled port through the crankshaft wall near the front of the bearing. Probably this, as much as anything, is responsible for the amount of fuel which escapes via the front of the bearing. Its purpose is to ensure that lubricant does reach the front of the bearing.



Working parts show offset plug in cylinder head and square cut ports.

The propeller driver is a relatively shallow light alloy casting locating on the taper length of the shaft with a conventional washer and nut assembly for the propeller. There is an adequate length of shaft and threaded length to accommodate all sizes of propellers. Spraybar and needle valve assemblies are of brass, cadmium or dull nickel-plated, with a plated steel ratchet lock.

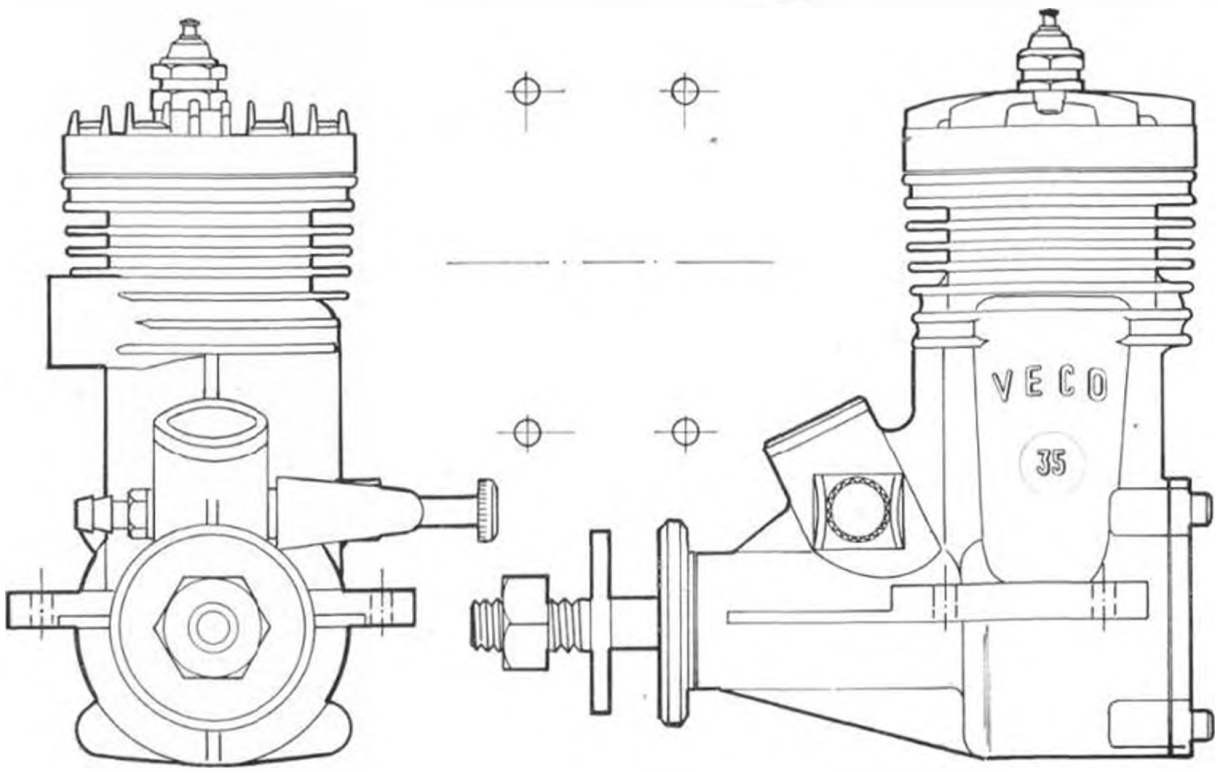
Summarising, despite the fact that we had to run this engine in for some time to achieve proper performance, we still have every admiration for the quality of design and workmanship and the performance achieved with Veco engines. The 35 C is a really good engine, rugged and *very* well made, and very reliable.

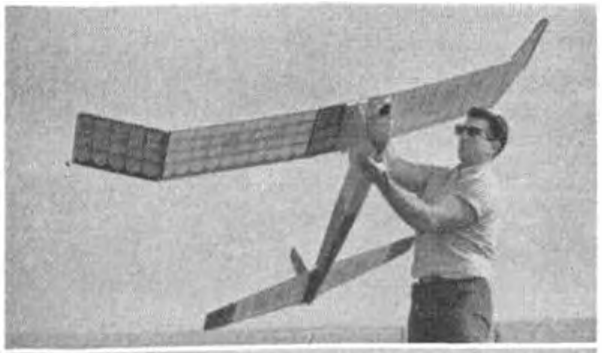
Specification:
Displacement: 5.743 c.c. (.3502 cu. in.)
Bore: .7845 in.
Stroke: .725 in.
Bore/Stroke ratio: 1.08
Bare weight: 7¼ ounces.
Max power: .538 B.H.P. at 14,000 r.p.m.
Max torque: 44 ounce inches at 10,500 r.p.m.
Power rating: .094 B.H.P. per c.c.
Power weight ratio: .0655 B.H.P. per ounce
Material Specification
Crankcase: light alloy pressure die casting
Cylinder (liner): mild steel (unhardened)
Piston: cast iron
Connecting rod: light alloy
Crankshaft: hardened steel, ¼ in. N.S.F. propeller shaft thread.
Cylinder head: light alloy pressure die casting
Glow plug: 1.5 volt element, ceramic insulator
Main bearing: plain, bronze bush
Crankcase back cover: light alloy pressure die casting.
Manufacturers:
Veco Products Corporation, Burbank, California, U.S.A.

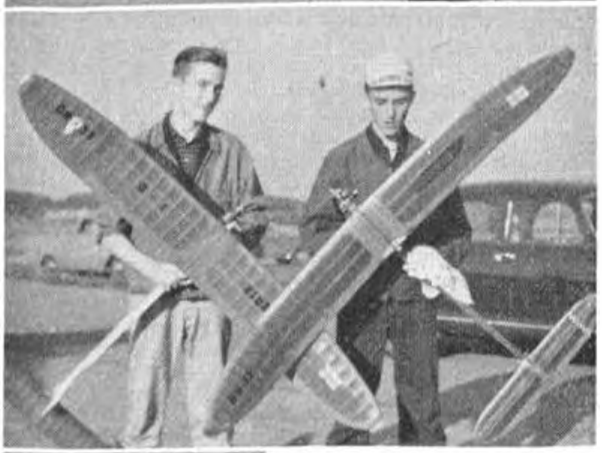
PROPELLER—R P M FIGURES

dia x pitch		*r p m*
10 x 6	Top Flite	11,500
10 x 3½	Top Flite	13,200
9 x 7	Top Flite	11,800
9 x 6	Top Flite	12,600
9 x 6	Keilkraft nylon	11,700
9 x 4	Keilkraft nylon	14,900
9 x 6	Frog nylon	13,600
10 x 6	Frog nylon	11,200
11 x 4	Tornado	11,200
11 x 6	Tornado	9,000
12 x 4	Tornado	9,700
12 x 5	Tornado	8,700

Fuel used: Keilkraft Record Nitrex 15.







Removal of loading restrictions for free flight in the U.S.A. and re-introduction of the 60 class will bring forth many models like Bob Bowen's 1,250 sq. in. *Ramrod*, Spitfire powered from Stockton, Calif. Laxman Twins FINLAND are seen with their F.A.I. models, above, they use Oliver and Cox TD and belong to successful Kiuru Club.

WORLD NEWS

THIRD MAN IN the U.S.A. stunt team for the World Championships will be Ed Southwick from California. Bob Palmer placed second in the first eliminator but did not compete in the second and judged instead. Travel to a far away place in Europe is likely to cost a Californian as much as £100 out of his own pocket and Bob reckons once, in recent years, was enough! The Team Race *equipe* is drawn more from the Eastern States where models are influenced considerably by British and Hungarian design features and use the well known British engines. Team placings in the final eliminator were:—

Stockton and Jehlik	East	...	5 : 12.5
Edwards and Edwards	East	...	5 : 27.6
Duncan and Bard	Midwest	...	5 : 40.8

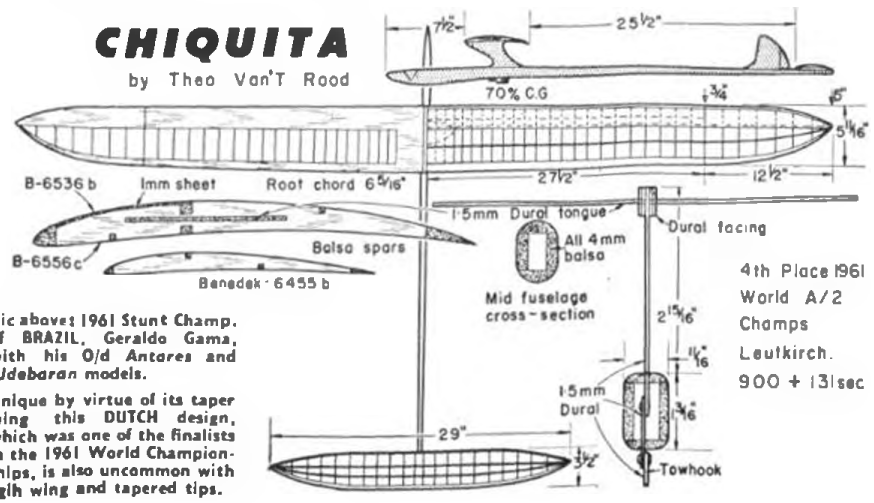
Strathmore Team Race circle we illustrated on page 12 last month is to be used as a stimulus for interest in the Detroit area with monthly contests for F.A.I. Team Racing right through from April to September 1962. Some idea of the intensity of organisation in these parts may be gathered by the fact that the Strathmoor M.A.C. 16th annual contest will be for 53 trophies costing $600 and we have no doubt that such encouragement coupled with the inherent American flair for producing extraordinarily well finished and designed models will eventually bring them through to the top in international racing.

In Chicago the indoor flying season has opened and a set programme of events for models ranging from hand launch gliders to pre-fab models, microfilm and paper covered stick models is set for every Saturday of each month at the Madison Street Armory—just another way in which a club manages to bring itself head and shoulders over the rest by finding and providing facilities.

Pan American's decision to discontinue their sponsorship of the PAA Load Events after fourteen years of activity through executive Dallas Sherman and Educational Director George Gardner has placed the AMA in a small quandary. Admittedly enthusiasm was beginning to wane in the U.S.A. Engine capacity was limited to .020 which, of course, meant that it was virtually a one engine competition. On the other hand, the cargo class offered a great challenge when modellers started to develop new forms of construction to reduce the loading on the wings and gearing to improve engine efficiency in a low speed model. Boundary layer control is surely just around the corner of development. The need is now for another sponsor to continue the stimulus opened up by PAA and with more flexible rules to make the event more open to everyone. Another point for discussion in the AMA is the question of international team selection methods. This is by no means limited to the U.S.A. for it is becoming plainly obvious that many nations are concerned with the desirability to put their aspiring team members through more flights to prove consistency and also there is a strong and welcome move to

CHIQUITA

by Theo Van'T Rood



Pic above: 1961 Stunt Champ. of BRAZIL, Geraldo Gama, with his O/d *Antares* and *Aldebaran* models.

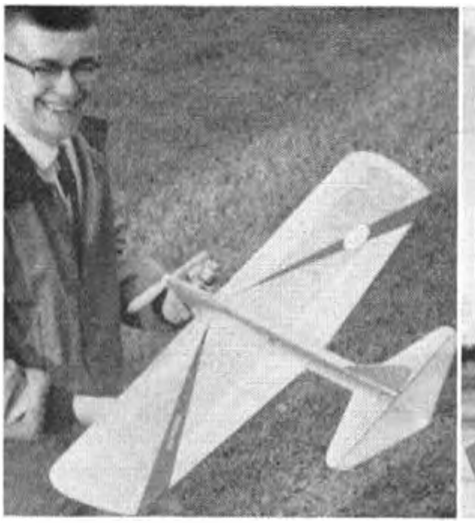
Unique by virtue of its taper wing this DUTCH design, which was one of the finalists in the 1961 World Championships, is also uncommon with high wing and tapered tips.

increase the number of flights at the finals to remove the luck element more effectively.

As this column is being prepared for press our friends "down under" in **Australia** are heading from all parts to Echuca, Victoria, for the week long 15th Annual Nationals from December 28th to January 4th. A characteristic feature of the Australian Nationals which could well be adopted in this country is the final presentation Dinner which makes for a grand get together for all concerned.

Vancouver is one of the keenest centres for the hobby in **Canada** and is certainly the most productive quarter of the entire world as far as Club News Letters are concerned. They also have an interesting contest which might be popular elsewhere. Known as *Thompson Trophy Racing* the rules are purposefully simple. Maximum engine 2.5 c.c., minimum span 20 in. *but* the model to be a 1/12th scale version of an actual Thompson Trophy Racer (pre-war) and must have the same colour scheme as the original. Line length is 52 ft. 6 ins. and tank size 1¾ fl. oz. This permits profile models as any construction is allowed and with the exciting variety of *Gee-Bee's*, *Caudrons*, *Folkerts*, *Lairds*, etc. it's not surprising that there is quite a following. Speaking of news letters, we have a list which is available free on receipt of a stamped and addressed envelope, giving our current register of interesting bulletins issued by Clubs and if any other Club wishes to join the register it should submit a sample to the Editorial offices.

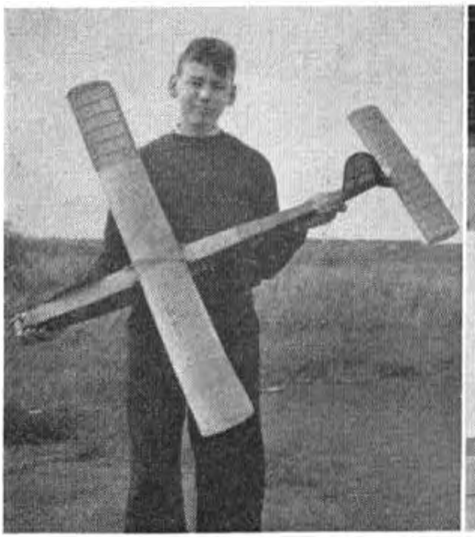
Foreign magazines this last month have brought forth a strange coincidence in design trend, for the **Rumanian** 2.5 c.c. diesel I.O.R., the **Russian** "Rythm" 2.5 c.c. racing diesel and the **American** Gilbert engines 1.2 and 1.7 c.c. for ready to fly plastics *all* use an inclined down draught type rear carburettor!

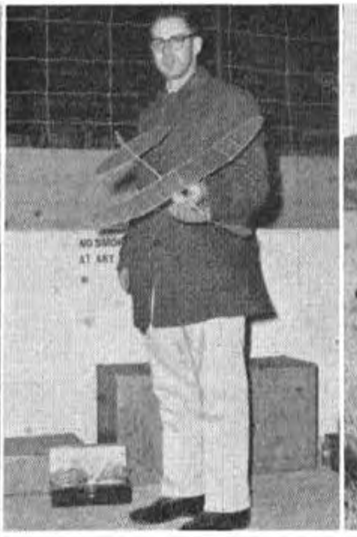


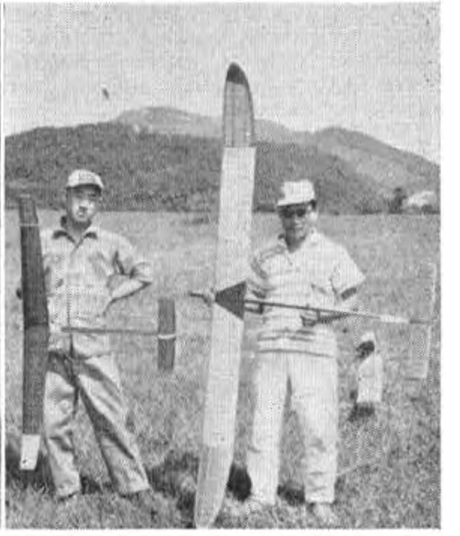
Left from SWEDEN, Goran Andersson's *Bombax*, a combat model with a tail! Span 33 ins., length 22¼ins., weight with Oliver Tiger about 12½ ozs., placed 5th and 9th at the Criterium of Aces last year. Right: Speed Champion of ARGENTINA is Carlos Zorzoli, seen here with his latest Super Tigre G20 F.A.I. design.

We have all seen models in productions from Hollywood and Elstree Studios but it is rare indeed that we hear of aeromodellers helping in cinefilm production in the **U.S.S.R.** Leningrad Clubsters produced a fleet of 6, I-16 Fighters, 3 Junkers 88s and 4 Messerschmitt 109s for "The Baltic Sky". Sixteen times the control line fleet was flown for the cameras over ice on the Finnish Gulf.

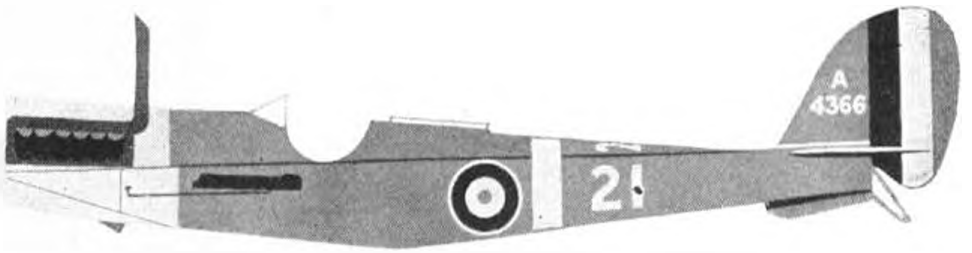
Incidentally, one gets the impression that U.S.S.R. teams in International events are nearly always composed of the same group of experts and this might, in turn, give the impression that there are relatively few Soviet modellers engaged in the F.A.I. competition classes. That this is not correct is now evident from figures quoted for the 1961 Championship where 300 entrants apparently passed a classification test and in the A/2 class, 44 took part in the final contest at Chkalova aerodrome, Moscow. The fact that Sokolov and Averianov placed 1st and 2nd in strong competition is surely a sign that as in any other country, supreme experts always filter through to the top.







Winner of Wakefield at 14th Nats. in AUSTRALIA, was Joseph Kenyon Ohio from A.P.S., an ideal novices design for this class. Centre is Charles Sotich, brother of A. M. A. President from Chicago, U.S.A., with his paper covered stick model for indoor flying at the Chicago Armory. Right, in JAPAN, Bunzo Yanigimachi with his D-C Dart .5 c.c. diesel ½A model and T. Yoshida with an Italian type A/2, show that they favour high aspect ratio and International selection of equipment.



R.E.8 with 9 Squadron marking and individual numbers as used from June 1917 to March 1918. This particular "21" crashed on August 16th, 1917 near Boesinghe, France.

R. F. C. SQDN. MARKINGS

PART FIVE

Described by Leslie A. Rogers

Drawn to 1/72nd scale by Ken McDonough

No. 9 Sqdn. R.F.C.

Derived from what was known as "The Wireless Unit R.F.C.", the Sqdn. flew the varied types of BE's until receiving RE8's in May/June, 1917. No details of markings are known for BE aircraft.

When using RE8 the **Sqdn. Marking** (carried from June, 1917 to March, 1918) was a single white band painted behind the cockade on the fuselage. This band passed over the top decking.

Individual markings were by numbers painted in white behind the Sqdn. marking and repeated on the top decking. Numbers normally ranged from 1 to 24.

After March, 1918, when Sqdn. markings were discontinued on two seaters, the same pattern of individual markings was used.

No. 45 Sqdn. R.F.C.

Arrived at Fienvillers aerodrome, France, on 15.10.16, equipped with *Sopwith* one-and-a-half strutters. Although these were soon outclassed, the Sqdn. was not re-equipped with *Camels* until August/September, 1917. In December, 1917, the Sqdn. was transferred to Italy, staying until September, 1918, when they returned to France, joining the Independent Force, R.A.F.

Using one-and-a-half strutters, markings of this period are very obscure, but it is known that a white band was painted right round the fuselage behind the cockade for a short while. This was probably a means of identification to ground observers.

Using *Sopwith Camels*, **Sqdn. Markings** were a white dumbell painted on the fuselage sides just forward of the tailplane, repeated on the top decking. This marking was carried from September, 1917, to Armistice.

Individual markings from September, 1917, until the move to Italy, are again uncertain, but it would appear from photographs that one flight used numbers in front of the cockade on the fuselage which were repeated on the wing to port of the centre section.

A point of note is that no other *Camel* Sqdn. in France used the dumbell marking after No. 45 left for Italy, until it was allocated to No. 17 American Sqdn. in July, 1918. In Italy the Sqdn. again used the dumbell marking, positioned as before.

Individual markings were:—

"A" flight letters A.B.C.D.E.F.
"B" flight letters G.H.J.K.L.M.
"C" flight letters N.O.P.Q.R.S.

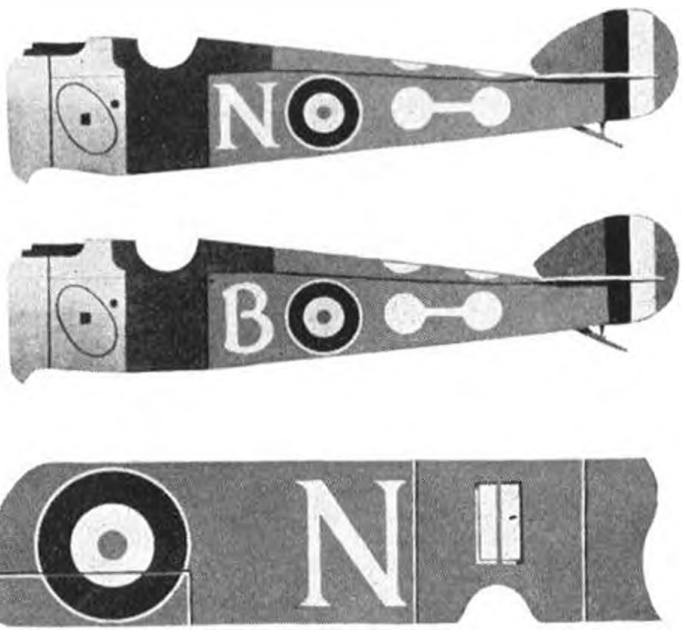
painted in white forward of the cockade on the fuselage sides and repeated on the top wing to port of the centre section.

Flight/Commanders normally used "A", "G", "N" and also carried streamers on rear interplane struts.

"A" flight used a more fancy style of lettering than did "B" and "C" flights.

At one time in Italy, the following serials were used:— B'6383 "A" of "A" Flight (used by Capt. MacMillan); B'2430 "B" of "A" Flight; B'6238 "C" of "A" Flight; B'6412 "D" of "A" Flight; B'2376 "E" of "A" Flight; B'4609 "F" of "A" Flight; B'3925 "L" of "B" Flight; B'5152 "M" of "B" Flight; B'2494 "S" of "C" Flight; B'2321 "S" of "C" Flight.

Photo shows part of 45 Sqdn. line-up with B'3925, letter L in fore ground. IWM picture Q.26582. Below is "C" Flight Commander's aircraft which carried streamers on rear interplane struts in Italy. 1918. Note the fancy lettering on this and letter B aircraft from "A" flight.



MORE RADIO MODELLERS are turning to Club activity it seems, for in the SOUTHERN AREA a new club has been formed. Southern Multi Flyers are at the moment ten R/C enthusiasts in the Brighton area, and equipment is, unfortunately limited to multi-channel equipment. We do hope this is not going to be a National trend, following not altogether happy instances in other countries, notably the U.S.A. and S. Africa. There's room for all enthusiasms in any club and if one particular branch feels itself more important than the rest, then it has no place in the movement. Some "modellers" tend to act with eyes and thoughts blinkered to their own channel of operation without thought for others, including those on whom they depend for organised events. The S.M.F. may find their closed shop an embarrassment, although for the moment they are happy.

Among other things, their members already own four *F. and M. relayless* 10-channel superhets, one *Orbit* 10 relayless and one *Space Control* outfit. Fortunate men! They are also enterprising in having a private field with take off and landing strip, which, because it is surrounded by cornfields, has led to the insistance on multi channel equipment in an effort to ensure that all flights terminate at the landing strip. Most members fly just for the love of it, but they also have Harry Brooks, regular competition flier. To date, two superhet models, *Smog Hog* and *Gee String*, have flown together, and shortly an attempt will be made at formation flying, with four superhets.

Most ambitious project however is a 9ft. span, Space Control equipped job, already built and shortly to be flown fitted with an Eumig Electric cine camera.

CLUB NEWS

Portsmouth and D.M.A.C. held their annual Combat and Free Flight events over two week-ends. P. Dempsey won Combat in very high wind and Free Flight on the following Sunday was marred by thick fog. Two juniors, E. Yerrell and R. Elliot won Rubber and Power to the embarrassment of some seniors who made up for this only by T. William's win in Glider.

First Club to catch on to the Coupe d'Hiver Specification, detailed in December AEROMODELLER, together with *Garter Knight* plan, appears to be the SOUTH EASTERN AREA'S Woking and D.M.Ac., who will be holding a F/F Rally to include a contest to this specification. Other events will be Rubber, Glider, Power, ½A Power, Chuck Glider. We personally are very pleased to see such an early and favourable reaction by modellers to the Coupe d'Hiver class, and all credit to the Woking boys for announcing their intention with plenty of time in hand for those interested to accustom themselves to Coupe d'Hiver models. Date of the Contest is not yet fixed, but will be between April and July. S.M.A.E. sanction is to be applied for.

Over to the LONDON AREA now, where Cosmo A.C. are holding a series of aeromodelling quizes on club nights with prizes for the winners at the end of the series. Current leaders, J. Curling, P. Crowhurst and D. Dixson, are all juniors, but with seven rounds yet to go, all is not yet over by a long way. Subjects range from Engine Recognition, to Balsa selection by sight alone and recently the Hon. Sec. managed to borrow half the balsa stockof Roland Rees Ltd. to illustrate his talk on balsa selection, also using several identical wings, some built with incorrect grades of wood, amply illustrating the importance of careful balsa selection. Some future lectures will be "Use of Tools" and one on Naval Aircraft by the U.S. Navy. Very clever innovation is a competition for the best written club report every month, the best to be supplied to AEROMODELLER for inclusion in *Club News* and ensures an interesting supplement.

Mill Hill and D.M.A.C. welcome new members to their A.G.M. on January 23rd at Dollis School, Mill Hill. Proceedings start at 8 p.m. Attractions to prospective new members are excellent control line facilities and the radio control section, members having six A.P.S. *Bickl's*.

1961 has been yet another successful season for St. Albans M.A.C., who won the Plugge Cup for the second year running. All praise must go to the core of consistent fliers they have, but thanks too, to those who gave vital help in retrieving and searching for lost models. In the face of an ever increasing standard of competition, their success over the past season was gained only by many hours of development.

Norwich M.F.C. in EAST ANGLIA have been doing a spot of R.T.P. flying in their clubroom, with scale and speed models. Naturally the hot rods appeared, D. Greening's all sheet job being the most lethal.

Stevenage M.A.C. in the SOUTH MIDLAND AREA, have produced another first-class edition of their newsletter "News and Views" in the November/December number, devoted mainly to Control Line and Radio Control, though this is not always the case. Contents include a three-view drawing of a 10oz. Combat model by Ian Tanner, and a discourse on the merits of various R/C kits.

Hatfield M.A.C.'s film show on Novemerb 10th was a great success, depicting their modelling activities through the past year. G. Cresswell's modelling experience has been put to good use whilst engaged on the Hatfield Group's project to compete for the Henry Kramer £5,000 prize.

In the MIDLANDS, Leicester M.A.C. held their 25th Anniversary Annual Dinner on December 9th, sixty members and friends enjoying half a chicken each, plus trimmings. They now have 170 members, but still do not intend to limit membership in any way (*good show!*). Winter activities include a Bring and Buy sale and the winter building competition, the subject being the *Mercury Marauder*. A prize of £5 will be awarded to first member to develop a silencer, which will be followed by a "silencers only" rule.

A lively, sometimes heated discussion took place at the NORTH WESTERN AREA A.G.M. over the cost of entry fees for Area contests. The eventual decision being a charge of 1/6 for seniors and 6d. for Juniors, to be doubled on the day. The secretary reported his receipt of a letter from the authorities at Tern Hill airfield, giving first and final warning concerning litter. This untidiness on the part of R/C fliers, who did not clear away all the wreckage of their pranged models, necessitated the use of a mechanical sweeper to clear the mess, holding up full size flying for two hours. In future, anyone observed dropping litter will immediately be removed from the airfield.

Wallasey M.A.C. extend a warm welcome to all those youngsters in their area who are in difficulty with their Christmas Kits and engines. Such an offer is well worth considering for it is a chance for the inexperienced to obtain the best from their new models. Contact D. J. Millachip, 55 Glenavon Road, Prenton, Birkenhead.

The date of the NORTHERN AREA Winter Rally has been put back to February 25th, 1962. The venue is provisionally Elvington airfield (South East of York); contests will be Open Rubber Power Glider, ½A, Single R/C, ½A, F.A.I. T/R and Combat. The date is definite: if no airfield is available then Baildon Moor will be the place—but if there, then no T/R. THE CLUBMAN.

1962 S.M.A.E. Contest programme

March 25th
- •K.M.A.A. Cup (U/R Glider) — *Area*
- Frog Senior Cup (U/R Power) — *Area*

April 1st
- Control Line, Speed and Stunt — *Centralised*

April 8th
- •Astral Trophy (U/R Power) — *Area*
- Flight Cup (U/R Rubber) — *Area*

April 29th
- First Control Line Trials — *R.A.F. Barkston Heath*
- First Radio Control Trials — *R.A.F. Barkston Heath*

May 13th
- C.M.A. Cup (U/R Glider) — *Area*
- •Gutteridge Trophy (U/R Rubber) — *Area*

May 27th
- Second Control Line Trials — *R.A.F. Barkston Heath*
- Second Radio Control Trials — *R.A.F. Barkston Heath*

BRITISH NATIONAL CHAMPIONSHIPS

June 10th
- Thurston Cup (U/R Glider)
- Womens Cup (U/R Glider Rubber)
- R/C Scale (R.C. qualifying flights)
- Gold Trophy (C.L. Stunt)
- Knokke No. 2 Trophy (C.L. Scale qualifying flights)
- Team Racing (International Class)
- Combat (Heats) — *R.A.F. Barkston Heath*
- Speed — *R.A.F. Barkston Heath*

June 11th
- Super Scale Trophy (F/F Scale qualifying flights)
- Sir John Shelley (U/R Power)
- Model Aircraft Trophy (U/R Glider)
- P.A.A. Trophy (Pay Load, Class Class A)
- Ripmax Trophy (R.C. Mono control)
- Team Racing (Classes ½A and B)
- Combat (Finals)
- Speed
- Scale classes (Scale judging)

June 24th
- Gamage Cup (U/R Rubber) — *Decentralised*
- Pilcher Cup (U/R Glider) — *Decentralised*

July 8th
- Area Championships — *Centralised*

July 15th
- Control Line Speed and Stunt — *Centralised*

SCOTTISH GALA

July 22nd
- K.L.M. Trophy (U/R Power)
- C.M.D. Trophy (U/R Rubber) (U/R Glider)
- Taplin Trophy (R/C Mono control)
- Team Racing (Classes A and B)

August 5th
- Control Line Speed and Stunt — *Centralised*

August 19th
- S.M.A.E. Cup (A/2 Glider) — *Area*
- •Keil Trophy (Team Power) — *Area*

NORTHERN GALA

August 26th
- Hamley Trophy (U/R Power)
- Caton Trophy (U/R Rubber) (U/R Glider)
- S.M.A.E. Trophy (R/C Multi control)
- P.A.A. Load (Class A)
- Team Racing (Classes ½A, A and B)
- C.L. Stunt
- Speed

U.K. CHALLENGE MATCH

September 16th
- Halifax Trophy (F.A.I. Power) — *Area*
- •Farrow Shield (Team Rubber) — *Area*

September 23rd
- Control Line Speed and Stunt — *Centralised*
- AEROMODELLER Trophy (R.C. Multi control) — *Centralised*

September 30th
- •Model Engineer Cup (Team Glider) — *Area*
- Weston Cup (F.A.I. Rubber) — *Area*
- Power (½A) — *Area*

October 14th
- White Cup (U/R Power)
- Frog Junior (U/R Rubber Glider) — *Decentralised*

Sensation of several rallies during the latter part of 1961, was Frank Van den Bergh's red and white latest *Sweeper*, has near delta shape wing of only 54in. span. Orbit 10 relayless radio and steerable nosewheel, plus brakes, makes taxi out before take off a joy to behold. Has a prototype Merco 49 in front.

World Championships programme

1962	*C/L*	Russia, Kiev, September 1-7.
	R/C	Great Britain, Cranfield (date to be fixed).
	Indoor	Gr.at Britain, Cardington (late September).
1963	*F/F*	Austria, Wiener Neustadt.
	R/C	Belgium, Ghent.
1964	*C/L*	Hungary, Budaors.
	Indoor	Not allocated.
1965	*F/F and R/C*	Not allocated.
1966	*C/L and Indoor*	Not allocated.

International Contest Calendar 1962

February 11	*Finland, Helsinki*—Free Flight for Power, Rubber and Glider,
June 11-12	*France, at Maubeuge, Aerodrome Salemagne*—Free Flight, Control Line (Speed, Aerobatics, Team Racing, Combat). Radio Control, Power and Gliders in two categories Power and Flying wings.
July 8, 9, 10	*Germany (Hummerich, Coblenz)*—International Competition for Slope Flying on a magnetic Course; Radio Control rudder only gliders.
July 25—28	*Jugoslavia, at Varazdin:* 9th International Vartex. Cup. Competition for Gliders and Team Racing.
August 1—4	*Jugoslavia, at Lesce Bled*—Xth Criterium of Europe, for Power models; individual and team.
August 8—9	*Germany, Hesselberg*—Competition for Slope Flying on a magnetic course (Bavaria Cup).
August 13—14	*Jugoslavia, at Split*—8th International Hydro Cup of Jugoslavia; for Power and Rubber.
Aug. 31—Sept. 3	*Jugoslavia, at Pancevo*—International Competition for Flying Wings, Gliders and Power and Rubber engined models.
Aug.—Sept.	*Landesverband Saar* (Europa Cup, Saar).
Sept. 28—30	*Austria, at Lienz*—"Internationales - Dolomiten Pokal-Fliegen" for Radio Controlled models, Rudder only, for Gliders and Power.

Is undercamber necessary? *(cont. from page 77)*

Flight Tests

Following suggestions made by Werner Thies a fellow aeromodeller constructed an A/1 wing with the Gö 795 airfoil. For a wing chord of approximately 4½ in. it used a leading edge ⅛ in. wide. Though not expertly finished, its performance was nevertheless up to present standards in all respects.

For a long time airfoils with straight or only slightly concave bottom surfaces have been used for power models and they have yielded excellent results both in climb and glide. The Benedek designed "B 84/52-b", destined for use in power models, is almost identical to the Gö 795. A radio controlled glider of A/2 dimensions, built by Werner Thies, is equipped with the Gö 795. This model possesses very good flight characteristics and high performance.

A Wakefield model was built to test a wing with the Gö 795 section. For a wing chord of 5 in. the rib spacing was 1 in. Sag between wing ribs was very slight but initial test flights were disappointing. The glide, when handlaunched, was very flat and the model behaved in the expected manner. When we check the airfoil charts of the Gö 795, we find that it attains its optimum lift value (C_L = .7—.75) quite near the stalling point. On a comparatively small model having a wing with no washout, asymmetrical stalling of one wing panel is bound to occur under transverse flow conditions; this in turn results in quite uncontrollable flight behaviour. Slight washout should therefore be incorporated in the outer wing panels, when using such airfoils.

Résumé

Author Werner Thies has evaluated new scientific data. Theoretical results and practical data indicate that the commonly used thin and heavily cambered modern airfoil sections do not guarantee optimum performances for model work. Contrary to general opinion, flat-bottomed or only slightly concave airfoils are not only advantageous from a constructional point of view but they seem to be *superior* performance-wise at *low* Re-numbers. To believe that the performance of a model is solely governed by proper airfoil selection would, however, be a misinterpretation, since other factors must also be considered, which may well have a more decisive influence on final results.

Airfoil Ordinates for Gö & M.V.A. sections

% Station		0	1.25	2.5	5.0	7.5	10	15	20	30	40	50	60	70	80	90	95	100
417	Upper	0.65	2.5	3.5	5.05	6.25	7.05	8.15	8.85	9.3	9.15	8.55	7.55	6.25	4.5	2.4	1.2	0
	Lower	0.65	0.05	0.25	0.7	1.1	1.5	2.2	2.8	3.65	3.9	3.65	3.2	2.5	1.7	0.8	0.4	0
495	Upper	1.15	2.8	3.5	4.55	5.35	6.0	6.95	7.7	8.55	8.75	8.35	7.5	6.2	4.45	2.45	1.3	0
	Lower	1.15	0.35	0.15	0	0	0.1	0.45	0.85	1.65	2.35	2.8	2.95	2.75	2.15	1.2	0.65	0
803	Upper	1.3	—	4.5	5.9	7.1	7.9	9.0	9.6	10.1	10.0	9.3	8.1	6.5	4.7	2.7	1.7	0.5
	Lower	1.3	—	0.1	0.55	1.3	1.9	2.7	3.4	4.4	4.9	5.0	4.8	4.2	3.2	1.8	0.9	0
804	Upper	0.7	—	3.0	4.1	5.0	5.7	6.9	7.7	8.9	9.4	9.5	9.0	8.0	6.3	3.7	2.1	0.3
	Lower	0.7	—	0.1	0.3	0.6	1.0	1.6	2.2	3.15	3.65	3.7	3.7	3.4	3.0	2.3	1.5	0
796	Upper	3.6	5.6	6.6	8	8.9	9.7	10.7	11.5	12.0	11.8	11.1	9.7	7.9	5.8	3.3	2	0.6
	Lower	3.6	2	1.4	0.7	0.4	0.2	0	0.1	0	0	0	0	0	0	0	0	0.2
795	Upper	2.4	—	4.4	5.3	5.95	6.45	7.15	7.65	8.0	7.9	7.4	6.5	5.25	3.85	2.2	1.3	0.4
	Lower	2.4	—	0.9	0.5	0.25	0.15	0.05	0	0	0	0	0	0	0	0	0	0.1
801	Upper	1.2	3.8	5.15	6.8	8.0	8.9	10.2	11.1	11.8	11.6	10.75	9.45	7.7	5.5	3	1.7	0.4
	Lower	1.2	0	0	0.2	0.4	0.6	1.0	1.4	2.0	2.2	2.1	1.95	1.6	1.1	0.5	0.25	0
301	Upper	4.3	—	8.3	9.9	—	12.0	13.4	14.2	14.9	14.7	13.9	12.5	10.8	8.6	6.2	—	3.5
	Lower	4.3	—	3.1	3.3	—	3.7	4.2	4.6	5.2	5.4	5.3	5.2	4.9	4.3	3.8	—	3.2
123	Upper	1.0	2.8	3.6	4.9	5.8	6.6	7.7	8.4	9.0	9.0	8.5	7.6	6.2	4.4	2.3	—	0.2
	Lower	1.0	0.1	0.2	0.6	1.1	1.6	2.4		3.6	3.6	3.2	2.6	2.0	1.3	0.7	—	0

CLASSIFIED ADVERTISEMENTS

PRESS DATE for issue MARCH, 1962, JANUARY 19th, 1962

ADVERTISEMENT RATES :

Private Minimum 18 words 6/- and 4d. per extra word.
Trade Minimum 18 words 12/- and 8d. per extra word.

Box Numbers to count as six words when costing.

All replies to be sent care of Advertisement Department, Model Aeronautical Press Ltd., 38 Clarendon Road, Watford, Herts.

Copy received after first post on the 19th will be held over until the next issue, unless cancelled in writing before 10th of following month.

FOR SALE

Reptone Tx. and Rx., new never been used, guaranteed, £8; or will exchange for anything useful in aeromodelling. 17 Rosedale Road, Grays, Essex.

Mini-Reptone mod. escapement, £10; E.D. set, 110/-; Mini-Reptone DEAC conversion, £11, with 4 DEAC's; Boomerang set, 90/-; OMU 8 ch. set Xtal Tx. with power pack, P.C.I—Airtrol, unused, £8; Bellaphon A 6V. power pack, £8; Sextone, unused, £25; Cobb pilot box and escapement, 60/-; R.E.P. power pack, £6/10/-; E.D. Bee—Frog Venom, Baby Bee, A.M. .049, O.K. Cub, 25/- each; Merco 35, 70/-; Cox Olympic, unused, 60/-; also available, for sale or exchange, new R.E.P. and E.D. R/C equipment. K. M. Greaves, Hutton Rudby, Yarm, Yorks.

Pre-war Air Trails and M.A.N. Old issues of AEROMODELLER. Rare books Send S.A.E. for list. Hirdes, 2 Sandy Plot, Burton, Christchurch.

A.M. 15, v.g.c., 40/-; Allbon Dart, nearly new, 40/-; E.D. Racer, expertly tuned, 45/-; lovely KK Talon, never flown, 25/-; Stockdale, 52 Cargo Fleet Lane, Ormesby, Middlesbro.

Octone Circuit Transmitter and Relayless Receiver, £25; Transistorised Duramite, £5, (all unflown); Enya 29 IIIB, not run in, £3/10/-; DeBolt Cosmic Wind Kit, wing built, £2/10/-. Percy, "Vellan", Park Road, Oxted, Surrey.

New A.M.15, modified A.M.10, modified E.D. Racer, E.C.C. Telecommander and Receiver, 35/- each; tuned ETA 19, 70/-; Fox 35, 60/-; Durkin, 14 Clark Street, Morecambe.

Cleaning out! Airtrol Receiver, 3 escapements, relay, ammeters, electric motors, E.D. Racer with silencers, Mills 75, 3 sets airwheels, stern tube, etc. Offers? Phone Chobham 251 weekends.

8 channel simultaneous Citizenship transmitter and receiver complete with 4 Bonner servos, £50 o.n.o.; E.D. Black Prince 8 channel receiver, as new, £15; E.D. Black Prince 6 channel receiver, complete with 2 Gem and 4 micro gem relays, £10; Veco 35 R/C engine, £4; All in perfect working order, inspection invited. Payne's Radio Services, Market Hill, Chatteris, Cambs.

A.M. 15, 40/-; Frog 150, 25/-; Better offers taken. R. Adams, 84 Geils Avenue, Dumbarton.

Mini Reptone as new. Phone Lyme Regis 2213.

Fox 15, not yet run in with prop., 50/-; Fox 35, with exhaust restrictor, 65/-; Frog 150, not used since warranty claim, with prop., 35/-; FR clockwork escapement, 27/6; ED (Rubber) escapement, 7/6; Unitone crystal controlled transmitter, 120/-; New Fox .09, 30/-; Cobb Pulse box and escapement, 60/-; J. Bygraves, 129 London Road, Biggleswade, Beds.

E.C.C. Telecommander hand Tx., 46/-; 951 A Rx., 40/-; Hill Miniature Rx., 47/-; all perfect. A. Searl, 2 Lincoln Green, Maghull, Lancs.

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Model-Avia, the model magazine that covers the world of model flying. Edited in French. Send for free specimen and subscription details. Model-Avia, 31 rue du Printemps, Bruxelles 5, Belgium.

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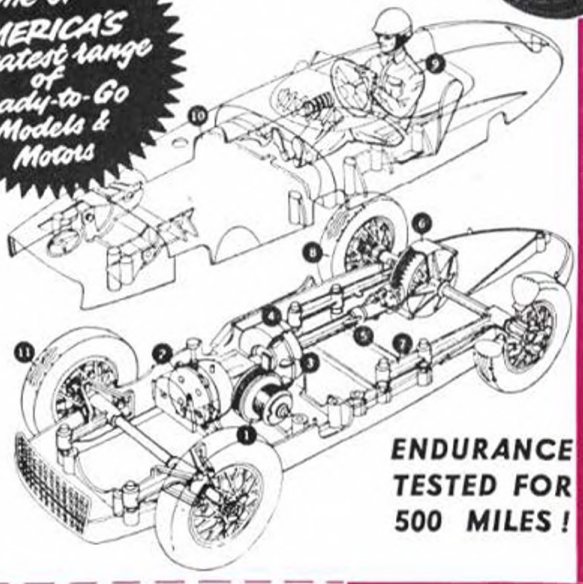

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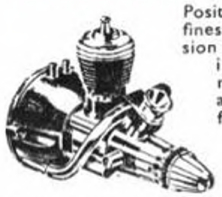

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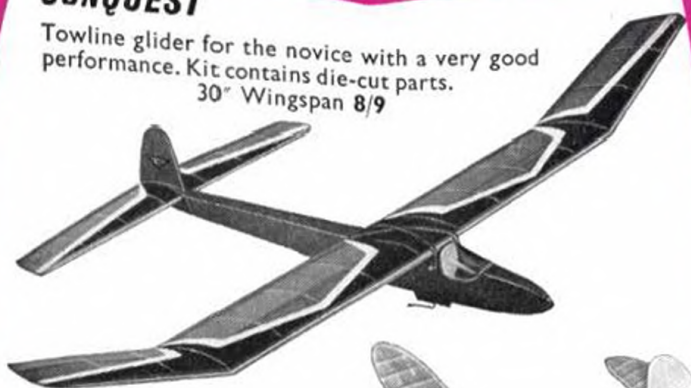

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