MODEL AIRCRAFT

1/-

APRIL, 1946
VOL. V. Nº 4

THE JOURNAL OF THE S.M.A.E.

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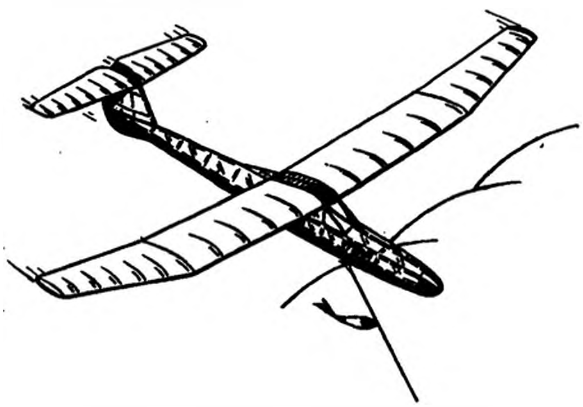

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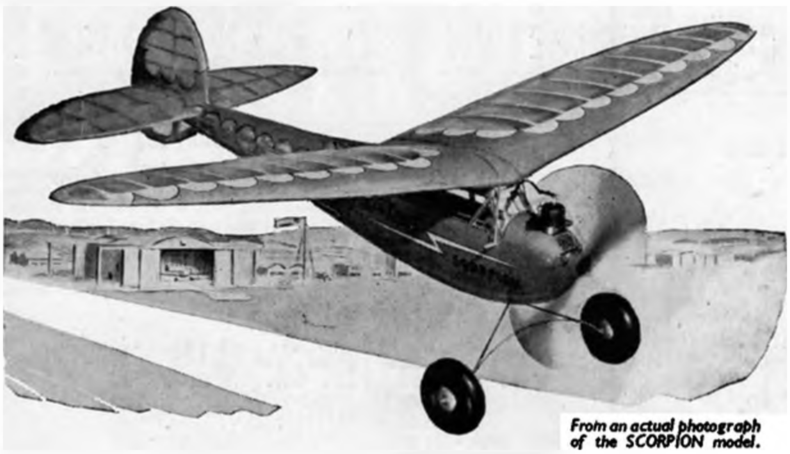

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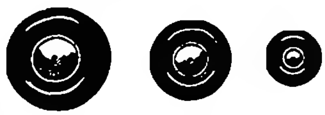

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Packed in labelled presentation box.

(Genuine Jap Tissue included while present stocks last.)

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Firefly ...	„	
Wellington	1/144"	

	Scale	
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2. Will we get SUPER BALSA in our kits?
3. Are petrol engines available?
4. Can dope be obtained in bottles?
5. What is the position regarding Jap Tissue and Props?
6. Are all kinds of accessories obtainable?

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MODEL AIRCRAFT

The Journal of the Society of Model Aeronautical Engineers

APRIL 1946
Volume 5. No. 4

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Edited by
A. F. HOULBERG, A.F.R.Ae.S.

The Editor invites correspondence, which should be addressed to him at "Crossways," 102, Staunton Road, Headington, Oxford.

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The Editor presents

A PERCIVAL MARSHALL PUBLICATION

PARADE....

British Aircraft on parade before the U.N.O. Delegates at Radlett Aerodrome included the following recent types. The Avro "Tudor I" transport G-AGRC, is shown at the top. Bottom right: The Blackburn "Firebrand IV" torpedo fighter. Bottom left: The Gloster "Meteor IV" jet fighter; two Rolls-Royce "Derwent" gas turbines.

News Review

Cover Story

We note with pleasure the gradual return to peace-time pursuits of well-known figures in the aeromodelling world on their release from the services and war-time activities. Our cover picture, which was taken by your Editor at Fairey's Aerodrome, on the occasion of one of the major pre-war competitions, shows a group of model celebrities who have recently returned to the movement. The tense moment depicted in the photograph shows E. Chasteneuf putting the last turns on his Wakefield model, with Eddie Cosh, the late secretary of the S.M.A.E., looking on, watch in hand, whilst the figure on the left is that of the well-known French enthusiast, Father Amiard, of Flers, Normandy.

E. Chasteneuf has just rejoined the model aircraft trade ; Eddie Cosh has joined the staff of the *Aeromodeller*, and Father Amiard, who has survived the German occupation, has just sent the S.M.A.E. an invitation to Flers to renew the pleasant pre-war associations which existed between the S.M.A.E. and French aeromodellers.

Auto-Ignition Engines

While the term "Compression-Ignition Engine" is a perfectly correct method of referring to the new engines, devoid of ignition equipment, which have been developed on the continent during the war period, it is long and does not come easily to the tongue.

The use of the term "Diesel" in connection with these engines is not strictly correct as they do not use the fuel injection cycle which is the basis of the engines devised by the late Dr. Diesel, although spontaneous or automatic ignition takes place, of course, immediately injection of the fuel is effected.

If one considers the actual sequence of operation of these new engines and their method of producing combustion of the charge one is led to the conclusion that they are in fact Automatic-Ignition Engines and this, it is suggested, exactly describes them and is a better nomenclature than either of those which have been used up to the present. We propose to refer to them by the abbreviation "Auto-Ignition Engine" in the pages of Model Aircraft in future, as we are of the opinion that, all things considered, it is a better term to use when referring to this type of motor.

The S.M.A.E. Dinner and Prizegiving

The most successful dinner so far held by the S.M.A.E. took place on Saturday, February 16th, at the Lysbeth Hall, Soho Square, on the occasion of their annual prizegiving. Over 200 attended to hear some witty speeches by the speakers, including one from Sir Fredererick Handley Page, who was the principal guest.

The dinner is fully reported elsewhere, but we would like to comment on the number of old enthusiasts present, some of whom had not attended an S.M.A.E. function since the outbreak of war, indicating that supporters of the Society who have been involved in the Services or essential war work are now finding their way back to a normal life in which the S.M.A.E. takes a place.

Another pleasing feature of the dinner was the large number of provincial club members who attended, showing that those outside the London Area are taking a more active interest in the parent body and the movement in general.

The Wakefield Cup

A passage in the speech made by Mr. F. J. Camm at the S.M.A.E. dinner, in his reply on behalf of the Press, recalled that the well-known pioneer of model aircraft, Mr. E. W. Twining, was the first winner of a Wakefield Cup.

While this is quite true, it must be made clear that he was referring to the original Silver-Gilt Cup donated to the old K. & M.A.A. by Sir Charles Wakefield, and *not* to the present International Wakefield Cup, which was donated to the S.M.A.E. at a much later date by Lord Wakefield, the first winner of which was H. Newall, on behalf of Great Britain.

The original Wakefield cup was withdrawn from competition on the absorption of the K. & M.A.A. by the S.M.A.E., and it has not been competed for since it was won by Leonard Slatter, now Air-Marshal Sir L. H. Slatter, K.B.E., C.B., D.S.C., D.F.C., just before the 1914-1918 war.

We hope this will dispel any confusion which may have been engendered in the minds of those who did not realise that two separate Wakefield Cups have been in existence.

Incidentally, whilst we are indulging in reminiscences, it is interesting to recall that E. W. Twining made a habit of being the first winner of important trophies and that he was also the first winner of the popular Gamage Cup with the first of the high performance "A" frame models. This win was largely responsible for setting a fashion for this type of machine, which persisted for some years.

"The Model Engineer" Exhibition

The competitions for model aircraft which will be held in connection with the *Model Engineer* Exhibition have now been announced and are as follow:—

Section "A" (Seniors)

Class 18.—Wakefield Type Models.
Class 19.—Flying Scale Models.
Class 20.—Power Driven Models (excluding Rubber driven).
Class 21.—Sailplanes.
Class 22.—Solid Type Models (to any scale).
Class 23.—Original Flying Exhibits.
Class 24.—Rubber Driven Models (open).

Section "B" (Juniors) (16 years and under)

Class 25.—Wakefield Type Models.
Class 26.—Flying Scale Models.
Class 27.—Power Driven Models (excluding Rubber driven).
Class 28.—Sailplanes.
Class 29.—Solid Type Models (to any scale).
Class 30.—Original Flying Exhibits.
Class 31.—Rubber Driven Models (open).

Attractive prizes will be awarded in each class, and in addition a Championship Prize for the best overall exhibit irrespective of the classes in both the Senior and Junior sections.

Send for your entry forms and start on your models right away. Don't leave things to the last moment.

Houses or Aircraft

Stepping from our models, at one end of the scale, to the projected super air liner "The Brabazon," at the other end, we feel sure that all model aircraft enthusiasts will view with regret the proposal to abandon its construction as a result of the difficulties which have arisen regarding the building of a runway at Bristol of sufficient length to ensure its take-off without the demolishing of some 30 houses.

It seems shortsighted, even in these days of acute housing shortage, that a project of such national importance as the "Brabazon" should be sacrificed for the sake of a few houses which could be rebuilt elsewhere at much less cost than that already expended on experimental work in connection with this aircraft.

It is to be hoped that the broad view will prevail, and that this country will not be robbed of the good work which has been carried out on this machine already, and of the prestige which would follow its completion.

New S.M.A.E. Officials

As a result of the resignation of the S.M.A.E. officials belonging to the Northern Heights Club, will everyone please note that the Secretary of the S.M.A.E. is now Mr. L. M. Walker, of 16, Conifers Close, Kingston Road, Teddington, Middx., and the technical Secretary is Mr. G. W. W. Harris, of Lancaster House, 11, Windsor Road, Farnborough, Hants.

Airfields as Flying Grounds

Following an approach made to the Ministry of Civil Aviation by the S.M.A.E., there is a good prospect of obtaining the use of an Air Ministry aerodrome for the Society's major events this year. A number of possible aerodromes have been offered by the Ministry, and it is possible that some of these might be available for Area Rallies or Club Rallies. A list of the aerodromes concerned is given below, and if any club wishes to obtain the use of one of these will they get into touch with the Secretary of the S.M.A.E. immediately, so that the necessary steps can be taken with the Ministry.

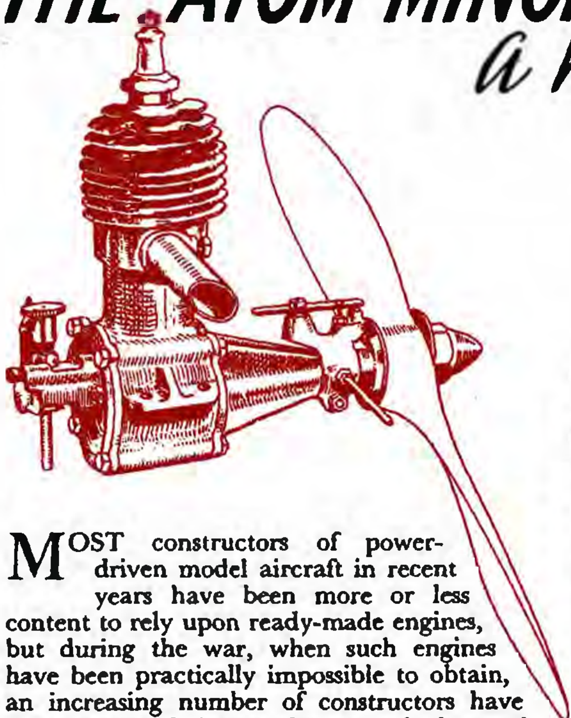
R.A.F. Aerodrome	*Location*
Bardney ...	10 miles E. Lincoln.
Birch ...	5 miles S.W. Colchester.
Boulmer ...	29 miles N. Newcastle.
Brunton ...	21 miles S.E. Berwick.
Castle Camps ...	14 miles S.E. Cambridge.
Chedworth ...	12 miles E.S.E. Gloucester.
Cosford ...	8 miles W.N.W. Wolverhampton.
Davidstow Moor	24 miles N.W. Plymouth.
Eye	19 miles N. Ipswich.
Fowlmere ...	8 miles S. Cambridge.
Knettishall ...	24 miles N.N.W. Ipswich.
Raydon ...	6 miles S.W. Ipswich.
Steeple Morden	13 miles S.W. Cambridge.
Warboys ...	5½ miles N.N.E. Huntingdon.
Windrush ...	20 miles E.S.E. Gloucester.
Winfield ...	3½ miles W.S.W. Berwick.
Woodhall Spa	15 miles E.S.E. Lincoln.
Ipswich	

When applying to the S.M.A.E. for use of any of these airfields a list of the dates on which they will want to be used is essential.

THE "ATOM MINOR" MARK III

A New 6 c.c. Engine for MODEL AIRCRAFT

by Edgar T. Westbury



MOST constructors of power-driven model aircraft in recent years have been more or less content to rely upon ready-made engines, but during the war, when such engines have been practically impossible to obtain, an increasing number of constructors have been turning their thoughts towards the possibility of producing their own engines. While welcoming this tendency, I would point out that the construction of one's own engine should not be regarded as a mere stop-gap expedient to tide over a temporary shortage in the supply of the commercial article, but that it is a very desirable object in itself. There are many reasons why model aircraft enthusiasts should take a keen and practical interest in the inner secrets of the design and construction of the engines used for propelling their machines ; not only does it enhance the interest and educational value of model aircraft, but it is also conducive to progress in aerodynamical design and development.

Although, in the manufacture of full-sized aircraft, it is customary to make airframes and engines in separate factories, or in separate departments of the same factory, their design is very closely inter-related, and no designer in either branch who is intent on efficiency and progress can possibly afford to disregard the other. The power requirements of model aircraft may not be so exacting as those encountered in full-size practice, but there is still a very strong case for a closer liaison between the two branches of design than has hitherto been obtained.

Many aircraft constructors have been deterred from attempting engine construction by the lack of facilities for mechanical engineering work. It is, of course, inevitable that the construction of an engine involves much more elaborate tool equipment than that of the airframe, including the use of a metal-turning lathe, not necessarily of an expensive or elaborate type, but capable of carrying out fairly accurate work. But this extension of the model aircraft constructor's workshop is more than justified for its own sake, and many parts of the models, apart from the engines, can be produced much more efficiently by the use of such equipment than is possible with the primitive tool kit which is often deemed sufficient for building airframes. I wish it was possible for me to tell readers how to build petrol engines without the use of a lathe, but the fact remains that it is generally impracticable, if not absolutely impossible, to do so : I may mention, however, that most of my own engines were built with the aid of a lathe which only cost £5 when I bought it brand new !

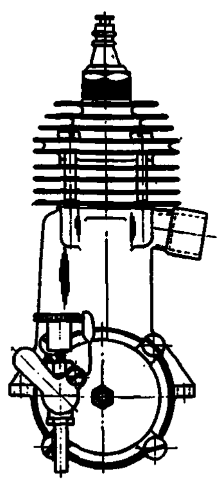
During many years of experience in the construction of model petrol engines, I have sought not only to produce designs for engines which were efficient, and well suited to their intended purpose, but also capable of being constructed with limited equipment, and requiring no exceptional skill on the part of constructors. Most of these engines have been highly successful, though they have often been criticised in comparison with some of the more popular commercial engines, mostly on account of their weight. But the line I have taken in engine design has always been dictated by sound reason, and I claim that the types of engines which I have recommended for amateur constructors are more suitable for their specific purposes than the orthodox commercial lightweight engine designs.

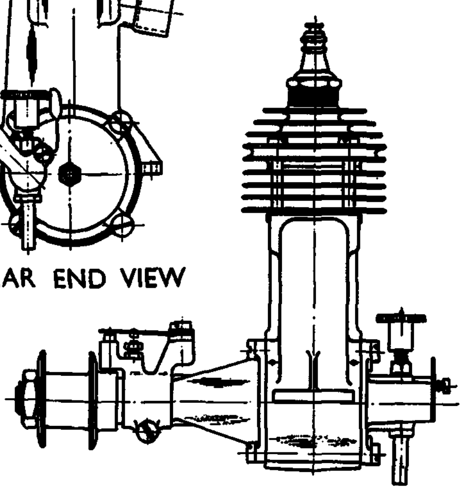
This point is often imperfectly appreciated, and I am often called upon to explain why a home-made engine should be any different in design to one produced in a factory. The first and most evident reason is that the equipment used to produce the two types of engines is totally different. Not only is the amateur's equipment of a simple type in most cases, but it is often limited to only one machine tool—the lathe—on which all machining operations have to be carried out. In the quantity production of engines, on the other hand, considerable elaboration of equipment, including the use of special jigs and fixtures, and special-purpose machines for such operations as milling, grinding and honing, may be justified if production be expedited thereby.

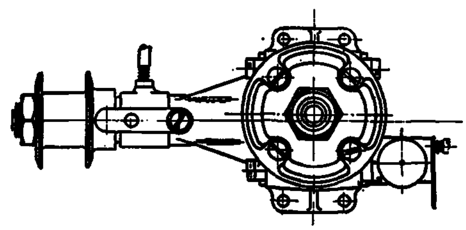
It is also necessary, or at least very desirable, that the design for the home-produced engine should be adaptable, to enable slight variations from the original design to be incorporated, either for experimental purposes, or to suit the fancy or special requirements of individual constructors. This is more important than it may appear at first sight, and I have found that it is more the exception than the rule for engines to be built exactly to the blueprints. A design which is too rigid, permitting of little or no variation in any of its parts, is in my experience unlikely to become popular among constructors.

This adaptability must extend also to the materials used in construction, and it is generally necessary to allow for the use of common and easily-obtainable materials in the design. The designer of a commercially-produced engine may specify the use of a special alloy-steel for heavily stressed engine parts, such as the crankshaft or cylinder; but if any such material is specified for an engine intended for amateur construction, every other prospective builder is sure to ask whether some other kind of steel will not do just as well! Many constructors are very keen on making use of material already available, and I have had to take into account the possibility that engine parts may be made up from old lorry axles, re-melted motor-car castings, railings, and even sash weights! Robustness in the inherent design of an engine is absolutely essential when one cannot be absolutely certain of the quality of the material which is to be put into it. An engine design can always be pared down to reduce its weight, but whether any really useful purpose can be served by doing so is quite another matter, and it is my opinion that this policy has been very much overdone in the past, both in certain types of commercial and home-produced engines.

In producing an engine design to suit the requirements of the up-to-date model aircraft constructor, I have borne all these points very carefully in mind; and another consideration which is equally important is the matter of engine size. It is possible to build a successful petrol engine of very small capacity, if one exercises sufficient care and skill, but it cannot be denied that the smaller sizes of engines below 4 or 5 c.c., however well designed and made, have a lower useful performance, and are more temperamental than those of more liberal capacity. Again relying on the lessons of past experience, I have come to the conclusion that for facility of construction and all-round usefulness, an engine of about 6 c.c. has strong claims to popularity. It can be built quite successfully on a lathe of the type and size commonly found in model engineering workshops, and is not so small as to involve "watchmaking" or super-precision work in its components; it can be made practically free from "temperament," and will propel a plane large enough to be aerodynamically efficient, without being so bulky as to be unwieldy in construction or handling.


REAR END VIEW

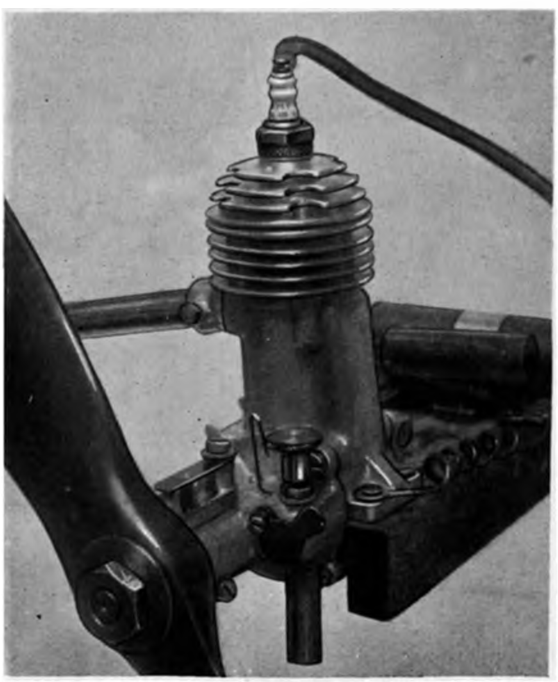

SIDE ELEVATION


PLAN VIEW

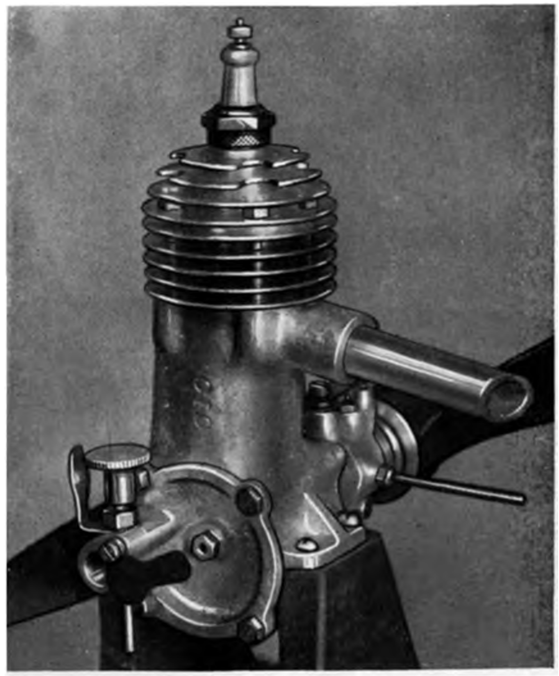
The "Atom Minor" Mark III Engine

The design which I am offering readers of MODEL AIRCRAFT is one which has been evolved from a long series of experiments, beginning with the original "Atom Minor," which was produced expressly to suit Captain Bowden's requirements in 1932. This engine was of 15 c.c. capacity, and it is hardly necessary to recount details of its pioneer successes ; but the need for a smaller engine was soon evident, and within about three years I had produced a smaller version of the design, which was known as the "New Atom Minor," and had a capacity of 6.3 c.c. (⅞ in. bore by ⅝ in. stroke). By the time this design was tested out and ready to turn loose on constructors, however, the commercial model aircraft engine had arrived, and had diverted attention from the possibilities of amateur construction of engines, which has never since been very popular in this particular field. Examples of the smaller engine have, however, been produced by many amateurs, and have proved very successful in model aircraft and power boats.

During the war, one of these engines was used in model aircraft experiments by one of the Services, and produced some initial results which justified the development of the design for further research work. This resulted in the production of the "Atom Minor" Mark III engine, a rather more efficient and adaptable engine than its predecessor. A number of these engines have been produced by a well-known firm of engine manufacturers, and have proved not only highly satisfactory and reliable in performance, but much more durable and capable of sustaining rough usage than most engines in this class. One of the first engines made, after four years' hard work, is still a consistent easy starter, and shows no perceptible wear of the bearings, cylinder or piston. An engine of this type, with small detail modifications, such as a high-compression piston and cylinder head, has been tuned up by Mr. J. Cruickshank, of model racing-car fame, and has produced 0.29 h.p. at a speed of 11,000 r.p.m. These details are given to show that the design is one that has been fully proved, and as I am now free to publish its description, it is just the engine which can be recommended with confidence to readers of MODEL AIRCRAFT.



The "Atom Minor" Mark III engine, as originally constructed, with carburettor at the front.



Later development of engine, with carburettor shifted to the rear end.

Specification

Most of the original constructional features of the "Atom Minor" 15 c.c. and 6.3 c.c. engines have been retained, but one noticeable difference is that the orthodox port admission

(Continued on page 96)

Further Observations on "THIS & THAT"

By Lt.-Col. C. E. BOWDEN

WE knew before this war that the Germans were masters of the art of soaring flight in the model world and also in the full-sized world. They turned their attention to this aspect of aviation after World War I, when they were forbidden to make full-sized power-driven craft.

As was ably brought out by "Zephyr" in the January number of MODEL AIRCRAFT, weight to give momentum through air disturbances, was one of the main points that the Germans realised long before we in this country obtained the clue. I have a very efficient German model sailplane of 9 ft. span that is a colossal weight. Since the early days, the Germans have allied this weight to gain momentum idea with super streamlining and super, super "finish." They have also gone in for high-aspect ratio in a big way in the past. Results have been most impressive, and we British want to get down to those three things, at the same time making for ourselves *large* models.

I must emphasise that weight with aerodynamical uncleanliness will merely cause the model to sink like a brick.

I also watched the German instructors soaring these full size sailplanes. It all looks fantastically easy. There seems to be no difficulty to keep the things up. The difficulty is to get them down! In fact, they have to fit special "dethermalisers" to do this in the form of spoiler panels that are very simple and raised through slots in the wings. (See Fig. 2.) This method could be adopted to petrol models or model sailplanes, operated by a "timer," to prevent the models being lost in thermals. [This scheme is not sufficiently drastic for models.—ED.]

The German sailplanes have a lovely finish on them that glistens in the sun, and the German chief instructor told me it is one of their secrets of success. So put on plenty of polish, ye model men, until your creations gleam. Hang the weight, it will be useful provided you keep the sailplane "clean" in shape, and have a lightish wing loading.

A point I was vastly interested in was the mounting of the tailplanes and the wings. I expected to see elaborate fairings everywhere and tailplanes stuck up high as our model people over here are so keen about—without exception, and I feel the German knows what he is doing in the sailplane stuff, for one has only to watch him at it to be more than impressed, apart from the long list of records he has captured. The tailplanes are mounted without much filleting, but cleanly on *top of the fuselage* and *well in front of the fin*. (See Fig. 3; also refer back to Fig. 2.)

Now we talk a lot about the stability virtues of mounting our tailplanes up high on the fin to get the tail in undisturbed air. This to my mind looks unsightly, makes for difficult construction and often flappy and sloppy operation, and I have *never found it give superior stability on a petrol model* in actual practice! It is hard practical experience that counts.

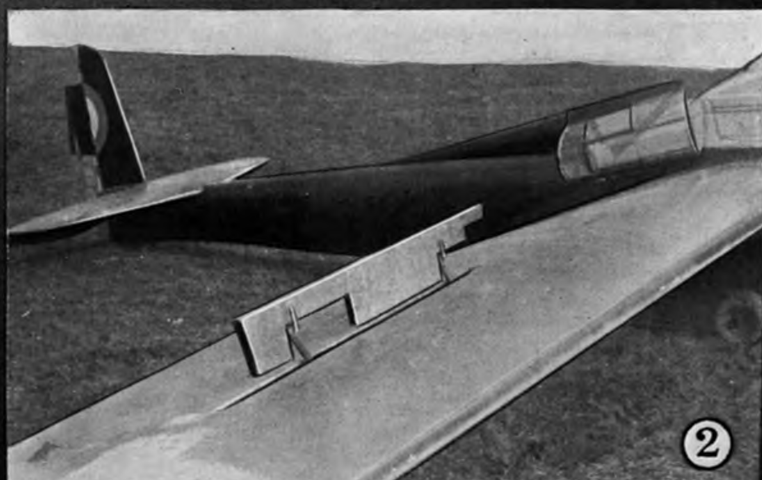
The setting of the tailplane high on the other hand, does cause out-of-phase drag leverages unless one also parasols the wings. I grant that it certainly works, and please do not think I entirely condemn it, but I ask, "Is it necessary, and why fit this sort of tail when the other type is proved satisfactory?"

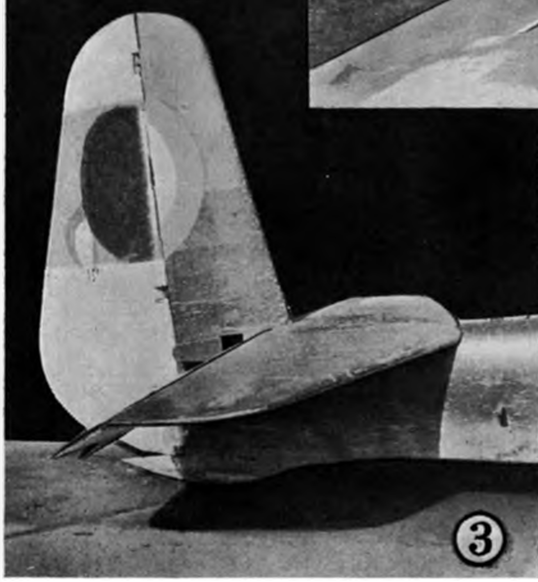
The Germans tow-launch their full-size soarers up at a tremendous angle which requires great stability of the machine where blanketing and other troubles could all upset stability, and yet they mount their tailplanes easily on top of the fuselage. All they do is to reasonably fair in the tailplane and to give a nice long fuselage, and *mount the tailplane halfway ahead of the fin*, with a little under-fin. This simple combination appears to deal with any stability problems, and is structurally much more efficient and rigid.

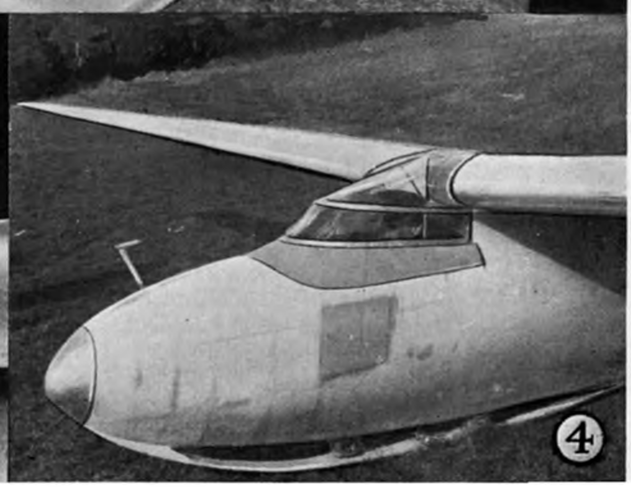
I do not think we want to be dogmatic about anything, but results do count, and I feel there is something there backed up by practical results for us modellers to seriously consider, for we are going all tail-high at the moment like a fashion in women's clothes that sweeps the land. By the way, these bent banana-shaped model fuselages some model makers are now using seem to put up unnecessary drag. They are not, and never can be, true streamliners. I always ask myself, why does a man go to all the trouble to bend the tail end down of a nice monocoque fuselage and then find he has to mount the tail halfway up or at the top of a tall willowy fin?

Now, have a look at the wing mounting on the German "Olympia," Fig. 4. We see great simplicity and yet cleanliness. All the high-efficiency German sailplanes I saw were the same. It makes you think! Of course, it may not be the answer. But results do talk. I am told the Germans do not believe in the gull-wing

Illustrating This and That







centre-section. They maintain that a small dihedral is more efficient. Heavens, I shall be unpopular!

Some Observations on Thermals

Whilst on the subject of sailplanes, thermal soaring and risers crop up. As it is not only of such vital importance to the sailplane fan, but if you are a rubber-driven duration expert, you pray for a suitable thermal during a duration competition, and you set your model to circle in the hope that it will keep in this thermal should your model contact it.

If you are a sailplane man you should dream of thermals and up currents, knowing exactly where they are to be found and what causes them. You should visualise the country and the weather as a picture of up-risers and down-currents. It is not difficult to do if you think about it and know the reasons. The thermal therefore has a definite place in the activities of the model aeroplane enthusiast, and it is well worth his while to purchase a book on the matter and understand his subject.

Aeromodellists often gaily say, " Oh, I caught a lovely riser today and did umpteen minutes." But are there many that know where a thermal is likely to be found, or where and how high an uprising flow of air over a hill is likely to be found, also how a thermal is created. Also where the down currents occur? Does one know, for instance, that a newly-ploughed field causes a " riser " by giving off heat stored in the ground. That red roofs and yellow corn-fields do likewise, that a bonfire or a factory chimney can send one's model up. One of my hobbies is full-sized sailing, as well as model sailing, and when I was at Gibraltar I often made use of a certain advantageous flow of cold air which was being sucked in from the colder sea, to make room for the heated air that was rising over the hot roofs and sand of the little Spanish town of La-Linia. This won me several races, because I had craftily tested this out on non-racing days, and knew exactly where the thermal started its work. Fig. 5 gives a general idea of how some thermals are created.

" Smoke Gets into Your Eyes "

I was in bed in Germany recovering from 'flu, and my wireless was playing that well-known tune " Smoke gets in your eyes "—I was enjoying my first cigarette and it was one of those nice fat Egyptian ones that produces clouds of swirling smoke that one can make intriguing thick smoke rings with.

As a result of the tune I was ruminating on the mysteries of airflow " risers " and I blew out great clouds of smoke and idly watched the gentle up-risings and down-flow of the bluey-white wreathing smoke against a back-ground of sunlight which was streaming into my window.

Knowing about the bonfire business causing even a full-sized sailplane to rise, I thought I would see if I could create " risers " in miniature, and see how much heat was required, also the extent of the " riser." So I lit a candle (we always had them handy, because the electric light supply so often failed) and held the candle below my nicely wreathing cloud of smoke with the sun lighting up its antics.

Up shot a perfect " riser " in miniature of great velocity, which continued up to the high ceiling of the room! Now, if a candle can create such a stir one can well see how a fire or a number of hot factory chimneys can push a sailplane up and why sailplane pilots use these things. The point that particularly interested me was, how thin the up current or column of air can be and how it sucks in the colder air around it, also how, in order to keep in such a thermal, the model must circle quite tightly without being too tight to lose lift.

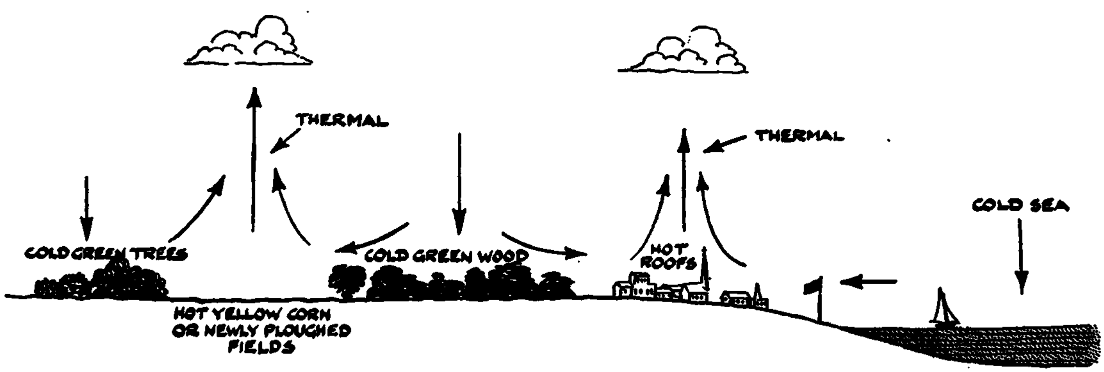


Fig. 5. How some thermals are created.

Rubber Review

BY E. CHASTENEUF

MANY of my readers will be strangers to me, owing to my six years' absence in the R.A.F., but that can soon be remedied. What cannot so easily be remedied is the present shortage of rubber but now that it is becoming available again, much can be done to make or mar successful flights, and a knowledge of the right way to treat it contributes to longevity and satisfactory service.

There are three sizes chiefly used for duration flying, 1/8-in., 3/16-in., and 1/4-in. All of these sizes can be obtained in either 1/24th-in. and 1/30th-in. thicknesses. Any of these sizes can be used successfully and it is really a matter of personal choice rather than one of practical results. The following table will explain the application and suitable anounts for use in different sizes and types of models.

It is impossible to give an accurate table of turns for present-day rubber, owing to the great variation in its quality.

It is obvious that much more importance must be attached to the care of rubber these days, and if some of my readers consider parts of this article unnecessary, inasmuch as they appear very simple, they must forgive their inclusion on the score that if carried out, they will save them considerable disappointment.

Every model enthusiast will at some time or another have suffered from broken strands and motors, and have immediately complained to the retailers about it. In most of these cases the trouble could have been avoided by a little care on the part of the user.

Here are the essential items in the care and handling of rubber in order to obtain maximum efficiency. When purchasing, do so in bulk rather than in small quantities, as, by so doing, several motors can be made up for testing purposes from one hank in order to find out the maximum breaking point of each, so that you can be assured of obtaining maximum results. There have been numerous articles written in the past quoting graphs and data whereby it may be possible to work out the maximum power and the number of turns, but by personal experience I have found that every batch of rubber varies considerably, particularly these days, and I therefore advocate, and use, the following method.

First of all decide upon the number and length of strands required and make up three identical motors. Always be very careful to get the lengths of the strands even, this being the essence of a successful motor, since one uneven length will lead to a broken strand ; the reason being, of course, that when winding, the shortened strand will become overstretched and thus liable to snap ; once broken, extra strain is placed on the remaining strands, leading to a complete breakage.

Weight of Wing		**Thicknesses of Rubber**					
Model	Area	1/4 in. × 1/30 in.	1/4 in. × 1/24 in.	3/16 in. × 1/30 in.	3/16 in. × 1/24 in.	1/8 in. × 1/30 in.	1/8 in. × 1/24 in.
8 ozs.	200 sq. in.	14 Strands	12 Strands	20 Strands	18 Strands	30 Strands	26 Strands
5 "	200 "	10 "	8 "	12 "	10 "	20 "	16 "
4 "	160 "	8 "	6 "	10 "	8 "	18 "	14 "
3 "	130 "	6 "	4 "	8 "	6 "	12 "	10 "
These equivalents are for pre-war rubber, but will serve as a guide when the new rubber comes along. All are for use on a diameter pitch ratio of 1-1½ with fairly wide blades.						Chiefly used by Americans, but would stand a little experiment.	

Wash the rubber well in water, and then dry it thoroughly ; this is a very necessary procedure, for appreciable quantities of grit and dust are picked up, also some manufacturers coat the rubber with French chalk, and if it is used without washing it will lead to breakages through chafing. Lubricate the rubber well with a solution of pure green soft soap, or any commercial makes of lubricant. Be very careful at all times to keep oil or spirits of any description away from the rubber, as this quickly causes it to deteriorate. Securely knot

(Continued on page 100)

The "AVRO LANCASTER B.Mk.1."

A 1/24th FLYING SCALE MODEL

By P. E. CLARK

IN undertaking the design of this model, special consideration was given to making it as simple and straightforward to construct as possible, and to this end considerable time and thought was given at the design stage to eliminate any possible constructional difficulties.

The obvious difficulty in making a model of this type is the drive for the four air-screws. The system employed is positive and smooth in operation and makes use of shaft drive with flexible spring couplings to deal with the angles.

Nevertheless, despite every possible simplification of the design, the machine remains an advanced model and must not be attempted unless backed by previous experience.

General Description

The airframe is built of hard woods throughout except for certain fairings which may be of block balsa, if covered with superfine tissue, banana-oiled and finished with matt cellulose paints.

The machine is built in ten parts, consisting of :—

(1) Fuselage ; (2) centre-section ; (3) and (4) two tailplanes ; (5) and (6) two rudders ; (7) and (8) two outer wings ; (9) and (10) two wing tips.

Fuselage

The main frame consists of four 3/32-in. square longerons, which run the length of the fuselage and are connected together by vertical and horizontal cross-pieces of the same section.

To this main structure are added quarter formers (1/32-in. sheet) to produce the oval fuselage cross-section required. These quarter formers coincide with the cross-pieces joining the main longerons.

The stringers, which are of ⅛-in. × 1/16-in. cross-section, are not recessed into them, as this would disturb the smooth line from nose to tail. They are laid flat over the bulkheads, to prevent an unduly sharp ridge appearing through the covering and also to give the fabric a larger area to grip.

In the nose portion there are eighteen stringers, but behind the cabin two more are added, making twenty in all.

The stringers are carried forward to former 1, where they terminate and are replaced by ten ⅛-in. square members, which project forward and support the nose-ring. The nose-ring is made from two layers of 1/16-in. sheet, cross laminated.

The front turret platform made from 1/32-in. sheet, is fixed above the nose-ring supports. At the rear it is anchored to former 1 ; its front end rests on the top of the nose-ring.

From under the leading edge of the wing forward to the nose-ring, the central under-stringer is replaced by a keel of 1/16-in. sheet.

The rear turret platform is supported by a 1/32-in. sheet keel. The extreme tail of this keel is faired into the under surface of the turret platform by two balsa blocks.

The cabin and turrets must not be added until the stressed-skin sheet-wood covering is fixed in place.

This covering is of 1/64-in. sheet throughout and extends from the nose-ring to just past the windows at the sides and from the nose-ring to the next former at the top and bottom, to provide seatings for the mid-upper and under turrets.

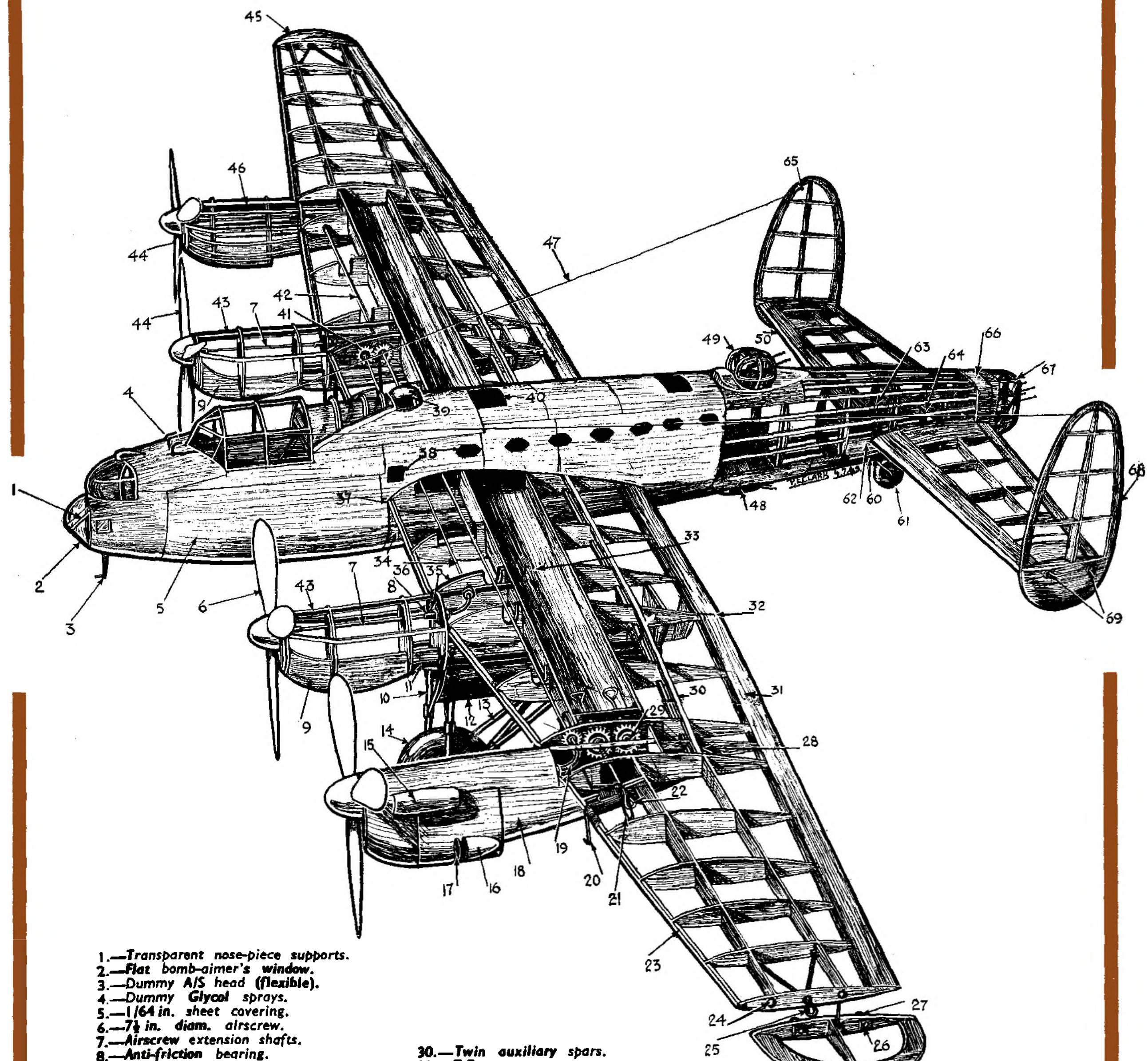
Smaller sheet-covered sections surround the point at which the tailwheel fork enters the fuselage, the tailplane roots and plug-in tubes.

The tailplane plug-in tubes are securely anchored to formers.

The tailwheel is of 1-in. diameter and the tailwheel fork is of 16-s.w.g. piano-wire anchored to the top and bottom of the former.

The cabin and turrets frameworks were originally of 1/16-in. sheet wood cut to shape, but a stronger and more accurate method is now employed. The main (forward) part of the cabin framework is built from 1/16-in. square birch steamed to the curved shape needed and strongly glued with an overlay of 1-mm. birch ply approximately ⅛ in. wide. Connecting cross-pieces are made in the same way. The after part of the cabin is made from strips of 1-mm. birch ply steamed to shape, the turrets also being strips of 1-mm. ply curved to shape and reinforced at vital points with 1/16-in. square birch strips.

The windows along each side of the fuselage are cut out to a rough diamond outline, they are glazed with celluloid cut to oval shapes and painted to the correct outline.



1.—*Transparent nose-piece supports.*
2.—*Flat bomb-aimer's window.*
3.—*Dummy A/S head (flexible).*
4.—*Dummy Glycol sprays.*
5.—*1/64 in. sheet covering.*
6.—*7½ in. diam. airscrew.*
7.—*Airscrew extension shafts.*
8.—*Anti-friction bearing.*
9.—*1/16 in. sheet keel.*
10.—*Main U/C leg.*
11.—*U/C support beams.*
12.—*1/32 in. U/C doors.*
13.—*Semi-flexible radius legs.*
14.—*Main U/C wheel, 2.5 in. diam.*
15.—*Hollow dummy shields.*
16.—*Dummy oil radiator.*
17.—*Ice guard.*
18.—*Sheet covering, shown in place.*
19.—*Flex drive through 90 deg.*
20.—*Brake release lever.*
21.—*Brake.*
22.—*Winding shaft (semi-flexible).*
23.—*⅛ in. sq. L.E. spar.*
24.—*Wing tip locating holes.*
25.—*Rubber band, through hole in tip and pegged.*
26.—*Plug reinforcement.*
27.—*Locating plug.*
28.—*Tube for outer-wing plug in.*
29.—*Main gear-box.*
30.—*Twin auxiliary spars.*
31.—*T.E. spar.*
32.—*Dihedral from here.*
33.—*Main (motor) spar.*
34.—*Centre section fixed to wing.*
35.—*Ply-faced rib and former.*
36.—*Transmitter shaft to inner airscrews.*
37.—*All spars pass through body.*
38.—*Window cut-outs (before glazing).*
39.—*Astro dome.*
40.—*Escape hatch openings.*
41.—*Transmitter gear-box.*
42.—*Transmitter shaft (outer).*
43.—*Inner nacelles, shown minus stringers and sheet covering.*
44.—*Outer airscrews revolve clockwise (inner anti-clockwise).*
45.—*Completed tips covered with 1/64 in. sheet.*
46.—*Nacelle shown with stringers in place.*
47.—*Tensioned aerial.*
48.—*Under turret.*
49.—*Upper turret with fairing.*
50.—*Tail plane L.E. covered with 1/64 in. sheet.*
60.—*Longeron.*
61.—*1 in. diam. tailwheel.*
62.—*1/64 in. sheet covering at tail root.*
63.—*Tailwheel fork anchored to former.*
64.—*Tail plane plug-in tube.*
65.—*Aerial attachment.*
66.—*1/64 in. sheet covering.*
67.—*Rear turret.*
68.—*Rudders held on by rubber bands.*
69.—*Tubes for rubber band.*
70.—*Lower portion of rudders covered with 1/64 in. sheet.*

The cabin is glazed with celluloid.

The two windows, one each side of the nose, are cut out and glazed with ⅛-in. sheet aircraft glass let in flush with the fuselage skin.

The flat bomb-aiming window is made from ⅛-in. flat aircraft glass. The lower edge of the window is bevelled and fixed to the nose-ring, from which it projects at about 45 deg.

At the upper edge of the window an oblong support of ¼-in. aero glass projects backwards at 90 deg. and is fixed to the underside of the turret platform.

The curved transparency around the bomb-aiming window is of moulded celluloid.

The mid upper-turret fairing is made from 1/16-in. sheet and 1/64-in. sheet and is fixed after the turret is glazed.

The escape hatches are hinged to open inwards, a small knob being provided to close them again, and are sufficiently tight fit to keep shut when closed, and so no lock is needed.

The portion of the fuselage under the centre section is detachable and forms part of the centre section of the wings and when in place fairs naturally into the fuselage. Correct location is ensured by locating blocks which fit into corresponding sockets.

Airscrews

The airscrews are of hard wood. The two outer revolve outward and the two inner revolve inwards.

They are 7½ in. in diameter, with the rear of the hubs reinforced with a disc of 3/32-in. sheet birch plywood.

Undercarriage

This consists of two units under each inner nacelle.

Each wheel has a diameter of 2½ in. and is of hard wood. A special anti-friction bearing is incorporated in the hub. In addition, each unit consists of an Oleo leg and a radius rod.

Wing Centre Section

The centre section extends to the outer nacelles and houses the power unit and drive. It is a completely self-contained unit.

The main spar is a three-sided section and, when the sheet covering is added, a complete box is formed. This " box " contains the two rubber motors ; these rotate oppositely and are geared together by two ¾-in. diameter brass gears, which mesh with another ½-in. diameter brass pinion, which rotates the main outer shaft, extending through the entire centre-section and drives the outer airscrews. The power is carried to the outer nacelles by the main shaft, through flexible spring drives which turn through 90 deg. and transmit the power to the airscrew shafts, through the front bearings, to the airscrews. Metal driving discs are attached to the shafts and the airscrews are secured by inserting a small screw through the driving disc into the air-screw hub.

On the inner rib of the inner-starboard nacelle is fixed the transmitter gearbox, which transmits the power from the main outer shaft to the subsidiary shaft, which drives the two inner airscrews. The transmitter gearbox consists of two ½-in. pinions connected to the two inner airscrews in the same manner as the outer airscrews are connected to the main shaft.

The main gearbox is wound by a driving shaft attached to the spindle of the middle gear by the outer-port nacelle, and is semi-flexible to prevent damage to the structure when winding with a hand drill. The end of this shaft projects through a hole in the outer port centre section into the port wing when it is in place.

All the bearings used in the shaft-drives, are special anti-friction type, and ball bearings are used in the two gearboxes and shaft drives.

The wing centre section consists of the main box-spar ; the sides of this box are of 1/16-in. sheet and the bottom of 1/32-in. sheet. The leading edge is of ⅛-in. square hard wood.

The trailing edge is of triangular section, a ½ in. wide strip of 1/32-in. wood is laid above and another below the trailing edge.

In addition, there are two ⅛-in. square auxiliary spars, one immediately above the other. These spars are between the main spar and the trailing-edge spar.

All ribs are of 1/16-in. sheet.

Nacelles are built up from a keel of 1/16-in. sheet, bulkheads of 1/16-in. sheet and three longerons of ⅛-in. square section arranged round the curvature of the upper halves of each bulkhead.

The side nacelle-longerons are fixed to the leading edge of the wing, but the central upper longerons extend back to the front of the box-spar to which they are fixed.

The front bulkhead of each nacelle is faced with 3/16-in. three-ply birch. The bearing for the shaft is let into the face of the ply and is flush with it.

All bearings for shafts and gearboxes are let let into plywood " webs," which transmit the forces to the normal structure to which they are anchored.

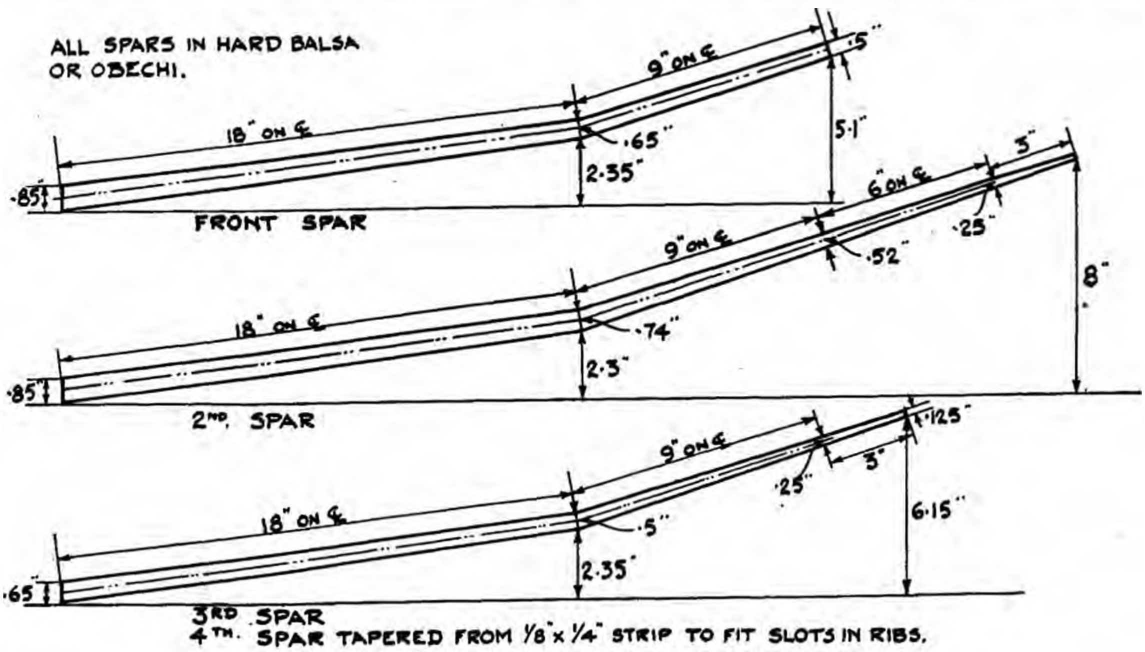
(Continued on page 100)

1st INSTALMENT OF MR. VINCE BENTLEY'S 72-in. SPAN PETROL MODEL

THE "CLOUD-DOZER"

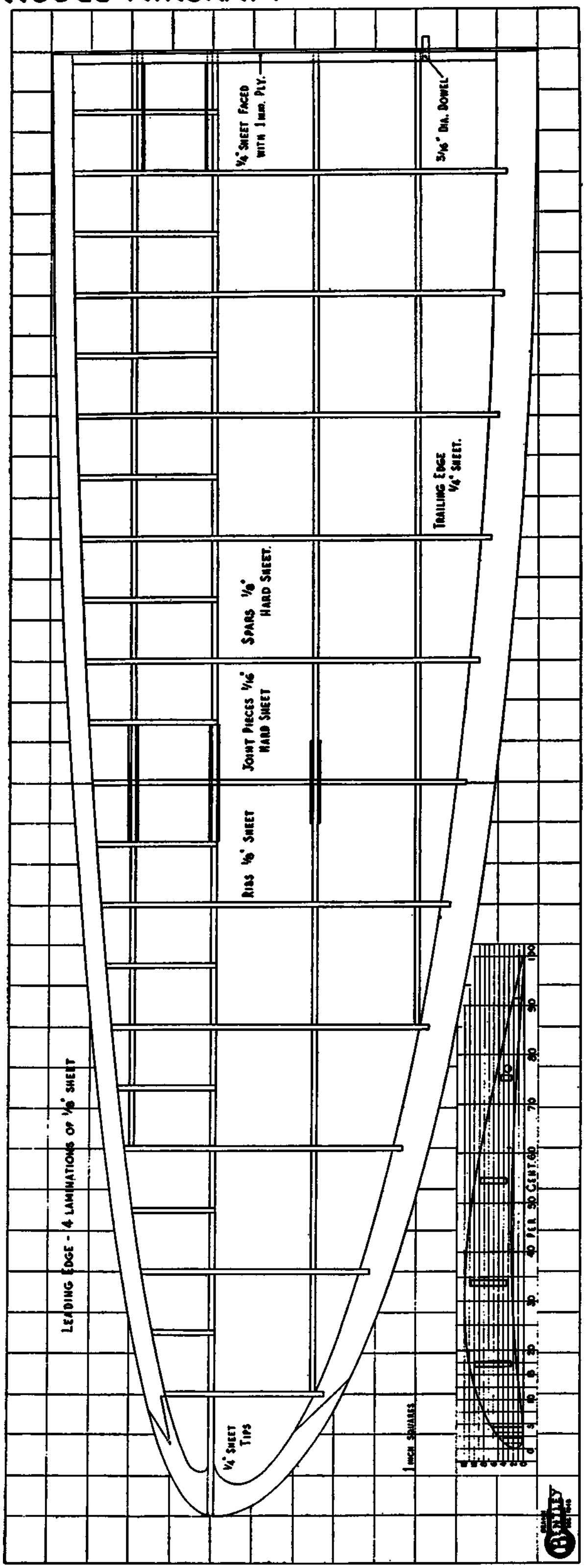
THIS month brings the first instalment of the building instructions for the six feet span duration model "Cloud-Dozer," and we start with the wing. The ribs come first, so start off by drawing out all the ribs full size, plotting them out by any of the usual methods from the ordinates given on the plan. Cut out two of each rib and half rib from ⅛-in. thick medium balsa sheet, with the exception of rib No. 1, which should be cut from ⅛-in. thick hard sheet, and faced on one side with 1-mm. ply, firmly cemented under pressure, being very careful to make one right hand and one left hand. Sand each pair of ribs so that they are true pairs, and if you want your finished framework to have a showroom appearance, sand both sides of each rib smooth also.

Cut the spars from hard ⅛-in. sheet balsa, or if you have no balsa hard enough, use obechi, and carefully trim the tip dihedral joints so that they fit together exactly at the correct dihedral. Cement the inner and outer components of each spar together as a butt joint strong enough to stand a certain amount of handling during assembly before the joint strengthening pieces are fitted. Having prepared the spars and allowed setting time for the joint, cement them into the slots of the root ribs, and follow up by sliding on all the half ribs and full ribs up to, but excepting, the rib at the dihedral break joint. Now fit the dihedral joint strenghtening pieces and bind them temporarily with tape or rubber to hold them tight while the cement hardens, and then slip on the remaining ribs up to the tip.



The wing spars showing their dimensions and dihedral angles.

With the framework held lightly over the plan, or by any other method of working with which you are familiar, space out and set all the ribs correctly and run cement around all spar-to-rib joints, with the exception of the rib which fits at the dihedral joint. This one will have to be left loose until the joint pieces are firmly set and the binding can be removed. While the cement is setting, cut out the trailing edge shapes from ⅛-in. medium balsa, also the two wing-tip shapes, and carve or sand the edges to the rough tapered section required.



Mark out all rib positions on the trailing edges, cut out the slots (I used one of those handy little "Eclipse" miniature hack-saws), and fit them into place on the ends of the ribs. Satisfy yourself by "eyeing" the framework, that they are set correctly before applying cement to each joint.

The leading edge is built up of four laminations of $\frac{1}{8}$-in. medium balsa sheet cemented in place one by one and held by pins. *Do* allow ample material for sanding to a correct shape when making this laminated leading edge, as it is so easy to think you are saving time and material by reducing the width of the laminations, only to find, when you start sanding, that you have not allowed quite as much as you would have liked.

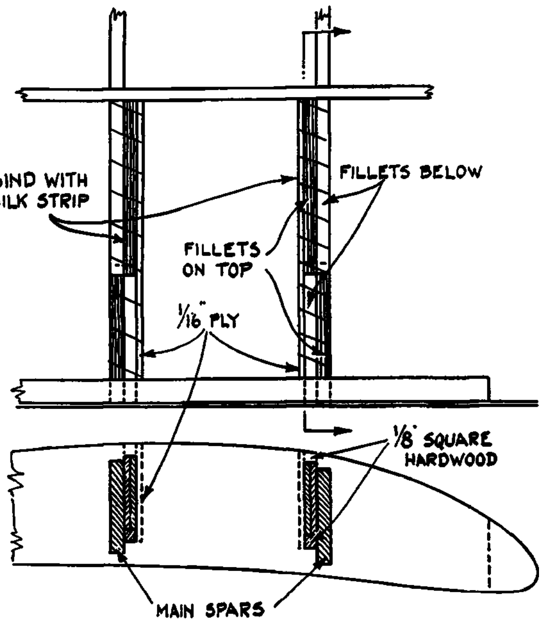
Finish the structure proper by fitting and cementing the tip pieces and finish sanding all over. The jointing spars for the centre joint, on the original, were made from two laminations of very hard $\frac{1}{16}$-in. sheet balsa (18 lb./cu. ft.) and the boxes were built around them in position with the two wing halves securely bound together by the root ribs to maintain the correct dihedral. The drawings explain the wing boxes better than any amount of description so follow them carefully when you do this part. To facilitate removal when set, the joint spars were smeared well with castor oil, and this little trick has proved quite successful even in subsequent use, as the oil seems to have expanded the wood very very slightly to make an excellent fit, while the surface of the wood, impregnated as it is with the oil, is slippery, and this all results in an easy but solid sliding joint. The complete wing structure of the original weighs 7 ounces uncovered.

A final word, please, about cements and cementing. I have found Rawlplug Durofix, very slightly thinned down with thinners, an excellent cement for heavy model work, but it has to be used correctly. When laminating any heavily stressed parts, and especially in all cases of ply to ply, or ply to balsa, it is essential to coat both surfaces thinly with Durofix and allow it to dry; then apply another coat to each surface, bring them into contact, press and rub them together, and finally leave them to set under pressure. In the case of large surfaces, the cement is not set hard right in the centre for some 72 hours, so bear this in mind when working.

On normal balsa to balsa joints, such as ribs to spar, it is quite adequate to run a fairly liberal fillet of Durofix around the joint, and when it is dry you will find that it has soaked well into the wood and formed a really sound fixture. I have found that one coat is also sufficient in the case of the balsa to balsa laminations on the leading edge, but, of course, the double application method is the safer method.

The Tailplane

The Cloud-Dozer's tailplane follows the wing fairly closely in design, but construction will be found to be many times easier and quicker.

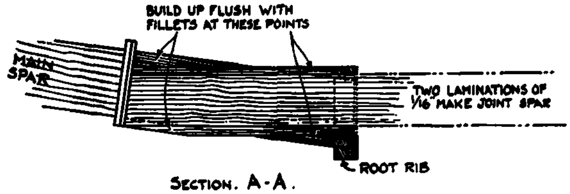


Wing joint box details.

Begin by cutting out two of each rib and half-rib from medium, $\frac{1}{8}$-in. sheet balsa, sanding each pair together to ensure that they are alike. Don't forget our previous tip for that exhibition finish on the framework by sanding the *face* of the ribs smooth also. After the ribs come the spars, which follow my usual practice for tail-plane spars, being perfectly straight along the top edge with the necessary taper incorporated in the bottom edge, which, to my mind, makes a much better-looking tail. Slide the ribs on to the spars in pairs, commencing with the two root ribs and working outwards. Check the assembly for accuracy over a full-size plan, and cement all joints well with Durofix or normal balsa cement. Follow up by cementing all the half-ribs to the front spar and whilst the cement is setting, trace out the trailing edge shapes on a sheet of medium, $\frac{1}{16}$-in. balsa, cut them out and slot them ready to fit in place on the ribs. Cut out the tip shapes from the same material and strip off three lengths of $\frac{1}{8}$-in. medium balsa, each $\frac{3}{8}$ in. wide, for the leading edge laminations. When the framework is set, fix the trailing edge and the rear tip piece in position using Durofix; and the first leading-edge lamination together with the front tip piece, using ordinary balsa cement. Use ordinary cement also for the second and third laminations and make sure that you squeeze them well into contact with each other. Cover the centre section just across the two root ribs with $\frac{1}{16}$-in. soft balsa, top and bottom, and finish off by sanding all over to correct shapes. As on the wing, a fair amount of the trailing and leading edges can be cut away with the knife as a preliminary to sanding.

Tail Trim

On highly-powered models such as the Cloud-Dozer, where take-off and climb take place at high speeds, a large angular difference in the incidence of wing and tail will result in looping, therefore we must have only a small difference, about 2 deg. If such a small difference in setting is used on the normal type of model and the centre of gravity is adjusted so that it glides perfectly, it is found that the high speed under power results in the tailplane contributing more than a fair share of lift and therefore forcing the model into a nose-down position. On the high-pylon, mounted wing type, the high centre of drag position caused by having the wing so high, counteracts the nose-down tendency, and as both the latter and its counteraction are each dependent upon the speed of the model, there exists a happy state of stability. It may sound like two wrongs making a right, but until it can be proved in practice that the theoretically more efficient mid-wing type will outclimb and outglide others, I think we would



Fillets used to build up either spar or boxes to each other in readiness for binding.

do best to rely on the well-tried high-parasol type for our duration power models. The forward position of the wing allows a long moment arm with a comparatively short fuselage length and also allows the use of a small fin, both desirable features, the one for stability and the other for minimum drag. Full size prints of all the ribs, and plans of the wing and tail-plane are available for those who require them, at 1s. per print, from the Editorial Offices.

(Continued from page 85)

system used in these engines has been superseded by a rotary-admission valve of the type which has proved highly successful in the "Kestrel" 5 c.c. and several other larger engines. The built-in full reservoir of the 6.3 c.c. "Atom Minor" (also used in the "Kestrel") has not been incorporated in the present design, though it can be added if desired; its omission is intended to eliminate possible restriction in the adaptability of the engine. This motive has also been the guiding principle in other features of design, including the carburettor, which, although built into the crankcase, like that of the "Kestrel," has a reversible jet assembly which enables the engine to be installed either in the upright or inverted position without structural alteration.

As originally constructed, the carburettor and admission valve were situated in the front of the engine, on the main bearing housing, but while this gave satisfactory results, the controls were rather crowded—especially as the contact-breaker was also mounted on this housing—and their location in close proximity to the airscrew made manipulation somewhat risky. The design was therefore modified by arranging the admission valve and carburettor on the rear crankcase endplate, so that the air intake is at the back of the engine. This is more convenient for most model aircraft installations, but there is some advantage in the forward-end carburettor for certain purposes.

Optional Sizes

Another modification which has been made in the later development of the engine is a slight reduction in the bore diameter of the cylinder, to bring the capacity within the 6 c.c. limit. This is a purely optional feature, and where it is not necessary to conform to any class restriction of engine capacity, constructors may prefer to retain the original cylinder bore of ¾ in., in order to obtain the maximum power output with little or no perceptible increase in the bulk or weight of the engine. The dimensions which will be given for the cylinder and piston will, however, conform to the smaller bore, so that the engine may truly be described as within the 6 c.c. class.

The general arrangement drawings show the external appearance of the engine, and in describing the various details, I shall try to indicate the reason for their particular features of design, and point out what modifications of shape, dimensions of materials are permissible without defeating their essential objects.

Readers who propose to construct this engine may be assured that castings and materials of approved quality will be available, and that any technical difficulties which they may encounter, as a result of inexperience in this particular class of work, will be given careful consideration. I am aiming to promote "engine-consciousness" among model aircraft enthusiasts, and shall spare no pains in assisting anyone who is making an attempt to produce an engine for himself.

Most of the structure of this engine consists of light alloy castings, which are reasonably straightforward in design and easy to machine on a light lathe of the type popular among model engineers. The main body casting comprises the barrel of the crankcase and a vertical extension surrounding the cylinder skirt, and the only absolutely essential machining operations on it are the boring and facing of these parts, which must be truly at right-angles to each other. Other machining operations, the accuracy of which do not vitally affect the engine performance, are the boring and facing of the exhaust socket, the planing or milling of the underside of the bearer feet, and drilling and tapping of holes.

One thing which I would like to impress upon constructors is that, although it is very important to work accurately to dimensions in machining engine components, a still more important consideration is the *geometric* accuracy of these parts, that is to say, alignment, squareness, parallelism, etc. Adherence to correct dimensions, such as the diameter of a shaft or a bearing bush, is very desirable, because it very much simplifies the machining and fitting of mating parts; but it matters very little, in the construction of a single engine, whether a shaft, or even a piston, is one- or two-thousandths of an inch too large or too small, so long as the bearing, or the cylinder bore, is machined to suit. The manufacture of engines in quantity, where parts have to be completely interchangeable, is quite another matter, and in this case it is necessary to specify the limits of error which can be tolerated in the machining of each part. I have sometimes been criticised for not specifying limits on my engine drawings; but the fact is that comparatively few of the constructors of these engines have the means of measuring to such fine limits.

The castings for the "Atom Minor" Mark III engine are obtainable from the E.M.P. Engineering Co. Ltd., 3, Victoria Street, London, S.W.1, who propose also to market a full range of accessories, including ignition coils, sparking plugs, etc., for model aircraft engines.

(To be continued)

JET & ROCKET PROPULSION

FOR MODEL AIRCRAFT

By KENNETH W. GATLAND

IN our last article we referred to the crude beginning of the "thrust augmenter" system. Three de Laval-type nozzles featured in the early work under consideration. The smallest had a 40 grain/sec. jet flow, and was designed for a charge case, 10 in. long, and 1.5 in. internal diameter, which housed a propellant charge slightly in excess of 8 ozs. This unit, without augmenters, developed a thrust of approximately 1 lb. With augmenters fitted the same size charge proved itself able to sustain a thrust of 6 *lb.*, and in one experiment a thrust of 10 *lb.* was achieved.

A larger unit had a 4 oz./sec. jet discharge, with a case 5 in. long and 3 in. diameter. It contained a modified gunpowder charge of just over 1 lb.

The larger type nozzles were ribbed externally and, prior to firing, a wet cotton wool wad was pressed around the outside, which served as coolant for the vulnerable nozzle throat. Used in conjunction with air augmenters, this cooling method was only called upon to function during the first few moments of a firing run, after which, the forced draught—due to the augmenter—served to remove the burnt wool and, subsequently, cool the nozzle by air-flow.

The 40 grain/sec. nozzle had no initial water cooling, but instead, a thin spun monel-metal jet was fitted. Otherwise, the nozzles were machined from pure copper, although castings were also tried and found quite satisfactory.

The experiments carried out by this group can easily be duplicated, and so long as reasonable precautions are taken, there is no harm in using metal charge containers. The Law is only concerned when there is a direct infringement of the Explosives Act, and as we have had cause to mention earlier, the rocket charges must be obtained from a licensed manufacturer. It is an infringement for the amateur to mix his own gunpowder, and it is also an offence to use firework rockets which have been modified to suit model propulsion.

It cannot be emphasised too strongly that, unless modellers adhere rigidly to these conditions, the authorities will not only deal drastically with those individuals who offend, but are likely to enforce a ban on the flying of reaction-powered models altogether. The use of explosives in public places, it will surely be appreciated, is very much a privilege.

In order to use metal nozzles, it is, of course, necessary to contain the paper-cased propellant in a light metal tube, the internal diameter of which corresponds with the outside diameter of the charge. It is *not* necessary to use steel tubes, as the paper containers of the charge are designed to withstand full combustion pressures. In view of this, a thin gauge copper would appear to be the most suitable, with the nozzle silver-soldered to one end. The charge is inserted from the open end, after which, the tube is sealed by a detachable wood or metal plug, held in place by screws.

The nozzles used in the Scottish experiments were developed by G. A. Roberts from the de Laval nozzles used in steam turbines, and

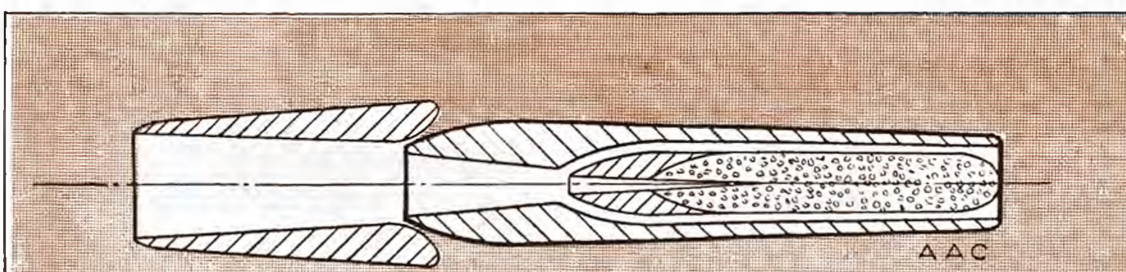


FIG. 4

An improved, two-stage, thrust augmenter.

were proved capable of increasing by as much as three or four times the dynamic thrust of the ordinary paper cased rocket charge. By the use of augmenters, this reactive force was further multiplied more than ten times, whilst the same augmenter device fitted to a commercial rocket of identical charge merely gave a thrust increase of three.

The exact nozzle length, orifice diameter, and angle of the divergent portion, are, of course, calculated according to the design and size of the motor, and the form of propellant.

The group later accelerated a D.H. Tiger Moth into the air with an augmented rocket unit. The complete device had an overall length of 11 ft., and was 1 ft. 10 in. in diameter. Although it weighed more than 33 lb., merely 1 *lb*. of propellant powder supplied the propulsive jet. The unit in full operation developed a reactive thrust of 150 lb. up to 50 m.p.h., the power of which only fell to 100 lb. at 100 m.p.h.

Early Development

A Frenchman, Henri F. Mélot, was one of the first to demonstrate the thrust-augmenter, which he featured in his "multi-nozzle" compressorless jet unit of 1917. A four-stage augmented device of progressively increasing dimensions, emanated from around the nozzle of a single combustion chamber. The motor employed induced air with petrol as fuel, and the resulting jet served to draw in air through the augmenter nozzles. The final effluent was expanded through a long divergent duct.

Although the device was tested under the auspices of the French military authorities during the war of 1914-18, there is no evidence of its use. It is probable that the producing chamber was the weak point of the design, due to the low compression of the fuel-air mixture, and this appears to be borne out by the test of a Mélot-type thrust augmenter at the Langley Memorial Aeronautical Laboratory, U.S.A., in 1927, when a high pressure fed chamber was substituted.

An interesting feature of this experiment was that the combustion chamber was supplied with compressed air only, which was not heated in any way. Its jet was, nevertheless, effective in inducing atmospheric air into the unit, which, it was found, resulted in a useful increase of the thrust.

The injection of air into the gas stream, however, should preferably be made before expansion of the jet is complete, allowing for further expansion after the air and effluent gases are mixed. Here, of course, we are speaking of a normal fuel-burning motor. In this instance, a proportion of the heat energy of the fuel is utilised in raising the mass of inducted air to jet velocity, thereby reducing the amount of energy available for conversion to kinetic energy in the efflux itself. The net result is that there is produced a low velocity, high mass, effluent of burnt fuel and inducted air, instead of the high velocity, low mass, effluent of the unaugmented rocket-power element.

Liquid and Powder Fuels

In America, where the explosive laws are not so critical, liquid oxygen and petrol is the commonest rocket propellant used by amateurs. The great majority of rocket tests, however, have been performed by private rocket groups — principally, the American Rocket Society, Inc.—and although their work has invariably little connection with aircraft, many of the propulsion units they have produced appear suitable for powering models.

The greater number of these motors were developed purely for ground tests on proving stands, the more successful being used in free-flight to drive projectiles. The improvement of rocket systems generally was the purpose behind the work and seldom was there any specific application, save possibly the meteorological sounding rocket.

It may seem unfortunate to the aeromodeller that the Explosives Act bars the use of liquid oxygen in this country.

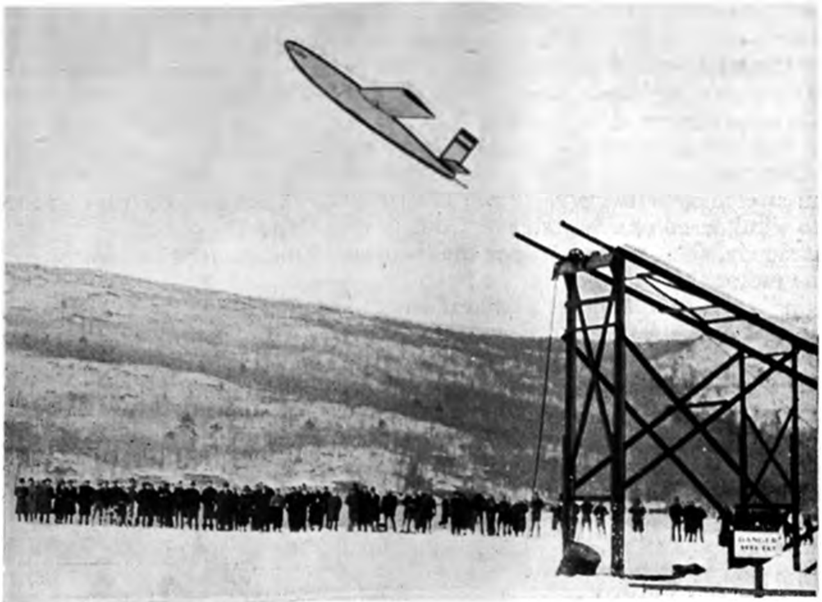
Liquid oxygen is, in any event, not a very satisfactory medium for model propulsion. Its low liquefaction temperature, minus 183 deg. Centigrade, makes it decidedly unstable, involving special care in its handling. A moment's indifference can mean severe frost-bite.

Under normal atmospheric conditions, the liquid is rapidly reconverted into gas, with the result that its containing-tank is subjected to high pressures, often surpassing "safe" pressures. The tank has consequently to be of heavy-gauge material and incorporate a safety valve.

Special vacuum containers of the Dewar or "thermos" type are required for its storage.

The German Bi-fuels

In view of the prevailing difficulties, the possibilities of adapting the unique bi-fuel propellants employed in the German rocket fighters and "flak" projectiles is our next consideration. Of these, the chief oxydisers were 80 to 85 per cent. hydrogen peroxide, 90 to 95 per cent. nitric acid, plus 10 to 15 per



A take-off by the Carver model from its starting ramp on Greenwood Lake, New York.

cent. sulphuric acid, ammonium nitrate and nitrous oxide. The fuels that were used in conjunction with them were equally varied; they included methanol, athanol, ether, gasoline, Diesel oil, 30 per cent. hydrazine hydrate solution in methanol, 57 per cent. in m-xylidine plus 43 per cent. tri-ethylamine and other more complex mixtures of hydrocarbons.

Of these, it cannot be claimed that any can be used unreservedly by the amateur. The Explosives Act is carefully worded against the introduction of any new chemical combination, whether used as explosive or propellant.

The fact remains, however, that the majority of the German propellants were not combustive in the sense that their expansion was caused by burning. It was purely "chemical combustion," and whether such would come under the meaning of the Act is, in the opinion of the writer, debatable.

The simplest example of these self-combusting propellants is hydrogen peroxide with calcium or sodium permanganate.

The product is superheated steam and oxygen and, of course, for further expansion the latter can be burnt with a liquid hydrocarbon (*e.g.* alcohol) in much the same way as liquid oxygen is burnt in the more conventional constant-volume motors.

In the use of these bi-fuels, it is not so much the legal aspect that is the barrier, but the difficulty in procuring the peroxide at sufficient strength. Before dealing with the matter in greater detail, however, it will be necessary to carry out more exacting tests and, therefore, judgment must be reserved for a later article.

Rocket 'Planes of 1936

The first successful rocket motors employing the "concentric-feed" system were the ones designed and built by Mr. Nathan Carver in 1936, which we will refer to in our next issue.

This illustration clearly indicates some of the precautions necessary to take when handling liquid-burning rocket planes.

RUBBER REVIEW

(Continued from page 89)

the two free ends and bind the knot on either side with stout thread, finishing with a reef-knot.

Having done this, obtain a winder with a stout hook in the chuck and another hook attached firmly to a bench or wall.

Take the first motor, and stretching it twice its own length, commence to wind on 200 turns. Allow the motor to run out slowly, then repeat the procedure, stretching the motor this time to three times its length and winding on 300 turns. Continue in this way increasing the stretched length by the original length until the rubber has been stretched five times its own length, winding on an additional 100 turns each time, until breaking point is reached. It is necessary to keep a careful check on the number of turns used, for reference. Having obtained the breaking point of the first motor, proceed in exactly the same way with the second and third motors, being careful to keep 300 turns below the breaking point of first, 250 of which can be used at contests if considered necessary.

On completion of these tests, and "running-in" procedure, wash the rubber well in water, dry it thoroughly, and lay it loosely in an air-tight tin. This will allow it to contract naturally and I feel sure you will find that this careful pre-winding and preparation will repay you on the contest day, for you will then be confident of just how much your rubber will stand.

For successful contest flying it is necessary to use a tensioning device, to prevent the completely-unwound motor from falling in the fuselage in such a position as to alter the centre of gravity, and consequently spoiling the glide owing to the change of trim.

Numerous spring devices have been described, but most of them are inferior to that devised by H. E. White, B.Sc., in 1939, which has proved a great advantage to duration flying.

For those who are unfamiliar with this device, we will assume that we are making a 12-strand motor, 36 in. long. Measure out six strands on the table 72 in. long and tie a small loop of cotton to mark the exact centre. Join the ends as described previously, remove the motor from the table and attach the ends to the winder and a hook in the wall or bench. Wind on 100 turns without pre-stretching. Whilst still wound, remove the winder from the end and attach this end to the other hook, being careful to hold the rubber motor at the centre while doing so. Re-attach the winder to centre of the motor and allow the rubber to run out normally; this will result in a rope effect and a finished motor much shorter than 36 in. When the motor is now fitted to the fuselage, it will be noted that it is tensioned between the hooks. For longer motors it may be necessary to increase the number of turns to 200, according to requirements.

The following points should be noted on the day of the contest :—

Keep the rubber from the direct rays of the sun or from bright light.

See that it is well lubricated prior to fitting it in the fuselage.

Even if using the "White" tensioning device, all contest flights should be wound with the motor stretched to five times its own length. Commence winding at this distance from the model, and wind on half the required turns. Continue winding, slowly walking towards the model, so that you complete the desired number of turns close to fuselage nose. Disengage the winder, and place the noseblock in position.

Do not put further turns on. If you do, this will assuredly lead to a broken motor and more work than you can handle in one day.

"AVRO LANCASTER"

(Continued from page 92)

The outer wings plug into ⅛-in. diameter celluloid tubes, fixed to the two outer-centre-section ribs on each side.

The section of the fuselage already mentioned is fixed under the centre section, the bulkheads at each end of it being 1/32-in. sheet.

The leading upper surface of the wing, back to the rear vertical member of the box-spar, is covered with 1/32-in. sheet. This covering is carried right through the nacelles with only a slot for the airscrew-drive shafts. The upper halves of the nacelles are covered with one piece of 1/32-in. sheet wood faired into the wing. The lower halves of the nacelles are planked in strips of 1/32-in. wood.

The leading under surface out to the inner nacelles is also covered with 1/32-in. sheet wood. The rest of the centre-section is covered with 1/64-in. sheet wood; this includes the under fairing.

The centre-section is attached to the fuselage by powerful rubber bands which pass over the main fuselage longerons and down to plywood eyeholes, let into the centre-section fairing. These bands are retained in position by streamlined pegs passed through them.

It is advisable to prepare a working drawing, using one of the scale plans available, before attempting to start work on the actual model. This will obviate complications during the building of the model.

NEWS from the CLUBS

S.M.A.E. 1946 COMPETITION CALENDAR

D	APRIL	14th—GAMAGE CUP (OPEN) (DECENTRALISED).
	"	21st—BUSHY PARK GALA DAY.
	"	28th—"M.E." No. 2 CUP (RUBBER) (PLUGGE POINTS).
	"	28th—MIDLAND AREA RALLY. HOCKLEY HEATH AERODROME.
	MAY	5th—SIR JOHN SHELLEY CUP (PETROL) MIDLAND AREA.
D	"	12th—"M.E." No. 1 CUP (GLIDER) (F.A.I.) (TEAM).
	"	26th—PILCHER CUP (GLIDER) (S.M.A.E. FORMULA) (PLUGGE POINTS).
	JUNE	9th—HAMLEY TROPHY (PETROL) NORTHERN AREA.
	"	16th—WESTON CUP (WAKEFIELD) (PLUGGE POINTS).
	"	23rd—NORTHERN AREA RALLY (1) IN MANCHESTER AREA.
D	"	30th—FROG JUNIOR CUP AND NATIONAL CUP (TEAM CONTEST).
	JULY	14th—THURSTON CUP (GLIDER) (F.A.I.) (PLUGGE POINTS).
	"	28th—NORTHERN AREA GLIDER MEETING (MERSEYSIDE) AT CLWYD.
	AUGUST	4th—BOWDEN TROPHY (PETROL) INTERNATIONAL LONDON AREA.
D	"	11th—FLIGHT CUP (RESTRICTED) WOMEN'S CHALLENGE CUP.
	"	11th—NORTHERN AREA RALLY (2) AT BAILDON, BRADFORD.
	"	18th—NORTHERN AREA "DAILY DESPATCH" GLIDER TROPHY.
	"	22nd—"MODEL ENGINEER" EXHIBITION.
D	"	25th—K. & M.A.A. CUP (BIPLANE) AND CIVIL SERVICE CUP (PAYLOAD.)

D = *DECENTRALISED COMPETITIONS.*

The Editor regrets that owing to the large amount of important business of the parent body for report this month, reports from individual clubs have had to be held over this month for publication in the next issue.

S.M.A.E. COUNCIL MEETING

Held at the Astoria Hotel, Blackpool, on Sunday, January 27th, 1946. In the chair, Mr. A. F. Houlberg.

Minutes

The Minutes of the previous Council Meeting were read. After questions had been answered, Mr. A. Crips moved, seconded by Mr. W. White, "Their adoption as read." The resolution was carried.

Correspondence

A letter from Mr. Titterington, the Hon. Secretary of the Northern Area Council, suggesting that the Society could improve the quality of the certificates being issued to contest winners, was read. Further, the S.M.A.E. Council might consider providing winners with badges. Mr. R. V. Bentley moved, seconded by Mr. F. E. Wilson, "That the certificates for both contest and records be re-designed." Mr. R. Copland moved, seconded by Mr. R. V. Bentley, "That the Society offers a prize of 3 guineas for the best design submitted by any member." Both were carried. Mr. Houlberg offered to provide this prize.

Discussing whether the cloth type of badge was preferable to metallic ones, the Hon. Secretary moved, "That metal badges be provided for competitors placed in all S.M.A.E. contests." Seconded by Mr. R. F. L. Gosling, carried by the Chairman's casting vote.

Gift to the S.M.A.E.

The Council recorded their appreciation of the gift of £10 by Mr. S. Lanfranchi to the Society's Appeal Fund.

Radio Frequency for Model Flyers

The Hon. Chairman and Secretary gave a report of the conference with Post Office Engineering Department.

The Hon. Secretary has received a letter confirming that a radio frequency has been allocated. It is as follows: 460.5 mc/s with a tolerance of 0.5 mc/s on either side and a power not exceeding 5 watts.

The S.M.A.E. and R.A.F. Airfields

The Hon. Secretary reported that he had approached the Ministry of Civil Aviation with a view to obtaining airfields that could be used by the Society. The choice of 19 airfields had been offered. The one selected would be used for National Competitions. The Hon. Secretary would endeavour to secure those remaining on the list for use by clubs for special events such as galas, and all clubs interested should send him the name of airfield and date. (See list in "News Review.")

Recommendations for S.M.A.E. 1946 Flying Programme (see heading paragraph).

Affiliation

The Council granted affiliation to the Hatfield M.A.C.

The Council expressed their appreciation of the arrangements by Mr. R. V. Bentley.

The "Vote of Thanks to the Chair" brought the meeting to a close at 5.40 p.m.

S.M.A.E. AREA COMMITTEE MEETING

Held at the Astoria Hotel, Blackpool, January 26th and 27th, 1946. In the Chair, Mr. A. F. Houlberg.

The Council of the S.M.A.E. at their meeting of October 28th, discussed the recommendations dealing with the development of the Area Scheme which had been put forward by the Northern Area Council. It was the desire of Council that the Scheme should come under review of a Committee comprising Messrs. A. F. Houlberg, A. G. Bell, R. V. Bentley, F. E. Wilson, R. Lawton (Northern Area), R. Jeffreys, (London Area), and S. W. Smith (Midland Area).

The Hon. Chairman of the Committee, Mr. A. F. Houlberg, was not present at the first sitting, owing to travelling difficulties. The Committee discussed the framework of their recommendations in readiness for the arrival of the Chairman, adjourning until 11 a.m., Jan. 27th.

On resumption, the Committee rejected any drastic interference with the Constitution of the Society, and proceeded to formulate proposals. Moved by Mr. A. G. Bell and seconded by Mr. S. W. Smith:—"That twelve Club Secretaries be appointed by the Committee as S.M.A.E. Area Secretaries. These gentlemen to be provided with stocks of the Society's stationery, transfers, badges, etc., and be empowered to act on behalf of the Society in their Areas. These S.M.A.E. Area Secretaries to be invited to contact other clubs officials in their areas and propose setting up Area Committees. Each S.M.A.E. Area Secretary to keep a monthly account with the Hon. Treasurer of the Society. Each Area to elect its own S.M.A.E. Area Competition Secretary, who shall be responsible for collecting and collating all S.M.A.E. contest results in his Area, and collecting entrants' fees. This official to forward these results, no later than the Thursday after the Sunday on which any S.M.A.E. contest is held, to the Hon. Competition Secretary of the Society. The S.M.A.E. Area Competition Secretary to keep a monthly account with the Hon. Treasurer of the Society. The S.M.A.E. Area Secretary and the S.M.A.E. Area Competition Secretary to become *ex-officio* members of the S.M.A.E. Council and may attend any Council Meeting on affairs affecting their Area.

In order to maintain the increased services the Committee recommended that the membership fees be increased from 1/- per member to 2/6 per member. It is not suggested that the whole of the increase be used for the Area Scheme.

This Committee also believes that the Area Scheme will benefit if the Committee created by the S.M.A.E. Council, composed of Leaders of the Areas and Council Members, continues. The meeting ended at 6.50 p.m.

REPORT on the S.M.A.E. ANNUAL PRIZEGIVING held on Saturday, February 16th, 1946.

The Annual Prizegiving Dinner and Dance was held at the Lysbeth Hall, London, W., on Saturday, February 16th. It was attended by over 200 members, the guest of the evening being Sir Frederick Handley Page, C.B.E.

Mr. A. F. Houlberg occupied the Chair, and after the toast to the King, Mr. M. R. Knight rose to propose the toast to the "Guests." He referred to Sir Frederick Handley Page as an outstanding personality in the aircraft industry, and recalled an early H.P. aircraft which had demonstrated its ability to fly without a tail in 1912. Sir Frederick's continued interest in the tailless type of aircraft was demonstrated by the sponsoring of an S.M.A.E. Contest by him for models of this type, and the Society was very grateful for his assistance and support.

Another prominent guest was Mr. F. J. Camm, the well known editor and technical journalist, and brother of Mr. S. Camm, of Hawker Aircraft fame.

Messrs. Catons were represented, but unfortunately Mr. Caton was unable to attend personally.

Members who had returned from the R.A.F., included Mr. Chasteneuf, Mr. Eddie Cosh and Mr. H. York.

Sir Frederick Handley Page in his reply on behalf of "The Guests," mentioned the tremendous encouragement given by the ladies. He expressed the opinion that in model aircraft there were great possibilities for the future, and the adventurous spirit prevailing was the same as that which encouraged the early pioneers to surmount the difficulties which beset them. He said that he had been very impressed by the control which the competitors who participated in the Bowden International Trophy showed over their models, and the enthusiasm which prevailed was the backbone of the S.M.A.E., which, he hoped, would go a very long way. The sporting side of the hobby which encouraged the competitive spirit in addition to healthy exercise, was very important, as was the research side which enabled flight characteristics to be judged and tests made with model aircraft from which could be obtained useful information for their full scale counterparts. He recalled how models were flown successfully by a number of people before the first man-carrying aircraft flew, and told how models were playing their part in the aviation industry.

The toast to "The Ladies" was proposed by Mr. Silvio Lanfranchi, who said that at "a dinner" the toast was important, but at "an aeromodelling dinner" it was an absolute necessity. He said that without the help and patience of the ladies who permitted frequent attendances to committees, club meetings, galas, etc., it would be impossible to continue in the hobby, and the gentlemen were eternally indebted to them.

Mrs. Hoyle, of Brentford, replying, thanked Mr. Lanfranchi for his kind remarks, and said how pleased the ladies were to be able to attend such an enjoyable evening.

Mr. F. E. Wilson, Press Secretary of the S.M.A.E. rose to propose the toast to "The Press," and thanked them for their support in the past, both to the Society and to the individual clubs. He said how pleased the members were to welcome representatives of many leading papers and journals to the Dinner.

In his reply on behalf of the Press, Mr. F. J. Camm said that as well as being there as a journalist and representing the Press he was there as an old friend of the S.M.A.E. as he had watched it grow and flourish. Referring to the Society publishing its own journal MODEL AIRCRAFT, he said that he congratulated them on obtaining "their freedom FROM the Press," as they could now freely express their own views.

He assured members of the authority of the S.M.A.E. and recalled past instances of rivals to the Society who were no longer in existence.

The S.M.A.E. was important because youth became interested and learned rapidly about aviation before becoming the eventual aircraft leaders of tomorrow.

Mr. L. Stott proposed the toast to "The S.M.A.E," expressing the hope for a spirit of good fellowship among model aircraft enthusiasts everywhere.

In his reply, Mr. Bell, Secretary of the Society, thanked members for their support of the dinner and thanked Mr. Camm for his statement regarding the authority of the S.M.A.E., which was specially welcome, coming as it did from a representative of the Press.

Members would be delighted to learn that the Ministry of Civil Aviation had provided the S.M.A.E. with a list of airfields to select from. A spot frequency allocation had recently been obtained for radio control, which was a step in the right direction. These were just a few of the important points gained by the S.M.A.E. recently for the use of modellers, and represented the policy of the Society.

Sir Frederick Handley Page presented the prizes for the Tailless Contest which he had sponsored, and afterwards presented the Society's trophies and prizes.

The evening closed with a very enjoyable dance, during which the Fellows of the S.M.A.E. who had been able to attend were presented with Fellows Certificates as a token of the Society's appreciation of their past service.

THE MINUTES OF THE ANNUAL GENERAL MEETING OF THE S.M.A.E. (1945)

Held at the Waldorf Hotel, Aldwych, London, February 17th, 1946. In the Chair, Mr. A. F. Houlberg.

The Hon. Secretary read the Minutes of the previous Annual General Meeting and those of the Extraordinary General Meeting. The motion "For adoption of the A.G.M. Minutes as read," was moved by Mr. H. P. Costenbarder, seconded by Mr. A. Crips, and carried.

Mr. C. S. Rushbrooke complained that the Minutes contained personal views and requested the Hon. Secretary to abstain from this practice when compiling the Minutes.

The motion "For the adoption of the E.G.M. Minutes as read," was moved by Mr. J. Buckeridge, seconded by Mr. R. F. L. Gosling, and carried.

Mr. T. W. Wickens proposed that in the National Cup, all entrants should pay their fees in the usual way, and those finishing 1st, 2nd, 3rd and 4th in any club effort for this Cup, be recognised as the team representing that club. This was agreed.

Mr. M. A. Wright moved, "That in view of the success of the S.M.A.E. in obtaining the use of a wave band for radio control, the recently elected Power Council nominate a further member for this body with qualifications on radio matters." Seconded by Mr. S. Lanfranchi, and carried.

Hon. Secretary's Annual General Report

Mr. Chairman, Ladies and Gentlemen,

This is the fifth Annual General Report I have had the honour to present to the Society, and I believe the best for any of those five years, but I would respectfully remind you that we should reflect on the historical events which culminated in the glorious Victory of the United Nations during this year, and the irreparable losses incurred by all. We in our Movement have suffered—have lost dear friends—and I invite you, Mr. Chairman, to call upon the meeting to stand in silence as a token of respect to their memory.

Report.—The outstanding contribution during the year was the creation by the Council of the Merit Certificate, and when the implications of these certificates are fully realised by our members, they will become increasingly popular. To Mr. R. F. L. Gosling goes the credit for pressing for the adoption of this service. I am pleased to report to you that as the result of an approach by the S.M.A.E. the Postmaster-General has granted a wave band of 460 mc/s with a power not exceeding 5 watts, for use in radio control. A further step forward for the benefit of those flying petrol driven model aircraft.

During the year the Fellows of the Society have, through the initiative of Mr. H. York, banded themselves into an Association of Fellows, and it is their wish to perform "Useful service to the Society."

A very happy and useful idea—the E.G.M. Dinner and the meeting the following day at the Waldorf Hotel held during the Winter—should be accepted as an annual fixture, the Dinner for its Social value and the E.G.M. for clearing all outstanding competition matters.

During the year those stalwarts of the Area scheme, the Northern Area Council, the Midland Area Council, and the London Area Council, acted in close and happy co-operation. They know what great strides the movement can make through the area scheme, and it is a great personal disappointment to observe other large areas which are apathetic in this direction.

Our Society has in many ways suffered greatly because of its inability to provide the movement with any effective publicity expressing the S.M.A.E.'s policy, etc. This has been overcome by developing the Society's Journal, now known as MODEL AIRCRAFT, into a first class asset to the Society. For twelve years the Society will receive sums of money raising from £10 per month based on the growth of its circulation. The sum of £530 has been paid over to the Society by the publishers during the year, Your Chairman, Mr. Houlberg, has been acting as the Magazine's Editor, and I think his efforts in this direction are outstanding.

The work of administering the affairs of the Society has been extremely heavy this year, and perhaps before the New Year is through I may be compelled to relinquish my office. During this trying period my Fellow Officers have co-operated with me fully and generously, and to them I offer my sincere thanks. It is my opinion that the Society should go forward with even greater momentum.

"Report accepted." Moved by Mr. Parker, seconded by Mr. T. London. Carried. The question of renumeration for the Secretary was raised by Mr. T. W. Wickens, and his motion, seconded by Mr. Parker, "That the Council go into the matter of renumeration for the Secretary at the earliest opportunity," was carried.

Hon. Treasurer's Annual Report and Balance Sheet

I would explain in the first instance that the Society's account this year covers only eleven months, as it was decided at the last Annual General Meeting to close the books a month earlier in order to give more time to prepare the accounts before the date of the A.G.M.

Although the balance in hand has increased from £92 4s. 7d. to £230 18s. 10d., things are not quite so rosy as they seem. Our income from ordinary sources, excluding the journal account which I will deal with later, was £422 15s. 9d., but our ordinary outgoings, again excluding the journal account and the costs of the Appeal, exceeded our income by £89 17s. 4d.

Competition entrance fees amounted to £55, a reduction of £23 over the preceding year, and against this we have £146 3s. 6d. going out in prizes. The increase in the number of Competitions in 1945 accounts for the large increase in prize money, the cost being nearly doubled.

It has been found in the past, that the more the Competitions are centralised the less the Society benefits in the way of entrance fees, and it would appear necessary for some sort of adjustment in the amount expended in prize money.

The Dethermaliser Booklets did not prove a financial success, as the cost of these amounted to £31 5s., and we have to date only received £11 2s. 3d. on the sale of these.

The Third Party Insurance Scheme has been in operation over one year now, and has so far proved itself a liability to the Society. We do not grumble about this, as we consider it part of the Service extended to members, but we might have received more support from members.

Postage has become a large item on the Society's expenditure and increased this year by £18.

The amount received in Affiliation fees during the year was £21 less than in the preceding year.

Now we will look on the brighter side. We made a profit of £31 on the sale of badges, and £21 on the sale of transfers. The annual dinner produced a profit of £7, which has never been known before in living memory.

As you all know by now, the Society disposed of the Journal to Messrs. Percival Marshall on very advantageous terms, and has assured the Society a steady income. Taking into consideration the fact that we were £89 on the debit side of the account at the end of the last financial year, the production and disposal of the paper has produced a profit to the Society of £220 8s. 8d. to date.

Against the above mentioned income there will be an expenditure for postages for copies sent to clubs and country members of approximately £30 per year.

With regard to the Appeal launched last year, no monies have yet been paid from these funds, but the main costs have been paid and included in this account.

Taking all the items shown in the account, we have made a profit on the year's working of £138 14s. 3d.

In conclusion, I would say that we can look forward with confidence to a general improvement in the Society's finances, but it is still necessary for the utmost economy to be exercised in expenses of the Society. Before I sit down I would like to place on record my appreciation for the help and guidance given me by our Chairman and all other Officers with whom I come into contact.

Mr. H. P. Costenbarder gave the Auditors' Report on behalf of Mr. E. Keil, and himself. Mr. Costenbarder congratulated the Hon. Treasurer on the state of the books. Mr. T. W. Wickens moved, seconded by Mr. F. Mayo, "That the Report and Balance Sheet be accepted and the Hon. Treasurer accorded a vote of thanks." Carried.

The adoption of the Auditors' Report was moved by Mr. T. W. Wickens, seconded by Mr. L. Stott, and carried. The question of the heavy expenditure of the Society in prize money was raised by Mr. Rushbrooke, and he moved, "That all prize money be eliminated from S.M.A.E. competitions." The motion was seconded by Mr. Costenbarder and carried.

Hon. Competition Secretary's Report

Mr. H. J. Towner said that owing to very heavy business commitments he could only give a brief report. He would like to put on record his appreciation and thanks to those officials who had helped him out towards the end of the season, particularly the Chairman. Mr. Rushbrooke moved, "The adoption of the Report." This was seconded by Mr. H. W. Hills and carried.

The Presidency of the S.M.A.E.

Mr. H. Boys moved, seconded by Mr. Sutcliffe, "That Sir Frederick Handley Page, C.B.E., be recommended to Council for this Office by the Meeting." Carried.

Mr. H. R. Turner moved, seconded by Mr. Vanderbeck, "That the nomination of Dr. A. P. Thurston be considered for this Office by the Council." The motion was rejected 88—20, twenty-one members abstaining.

Mr. R. F. L. Gosling moved, seconded by Mr. G. S. Rushbrooke, "That Sir C. R. Fairey be recommended by the Meeting for this Office to the Council." Carried.

1946 "Model Engineer" Exhibition

The Hon. Chairman suggested that the Secretary Competition Secretary and the Press Secretary be elected to serve on behalf of the Society on the appropriate committees for this Exhibition. Mr. Parker thereupon moved, "That these officials be invited to carry out this task." Seconded by Mr. Gosling and carried.

Mr. Wickens moved, "That if any additional members are required on these Committees the Council to have the right to co-opt," seconded by Mr. M. W. White. Carried.

Notice of Motions

The four following notice of motions were rejected :—

1. That the President when elected shall be responsible solely to the President of the Royal Aero Club. (Proposer, Mrs. Thurston.)
2. That no official shall hold more than one office at any one time. (Proposer, Mrs. Thurston.)
3. That in view of the pressure of work on present officials, two further secretaryships be created. One a Social Secretary, and two, a Complaints Secretary. (Proposer, Mrs. Thurston.)
4. That Clubs flying in de-centralised S.M.A.E. contests, shall exchange their timekeepers for those of other local clubs.

The Election of Officers for 1946

Hon. Chairman, Mr. A. F. Houlberg ; Hon. Vice-Chairman, Mr. R. F. L. Gosling ; Hon. General Secretary, Mr. A. G. Bell ; Hon. Treasurer, Mr. L. J. Hawkins ; Hon. Competition Secretary, Mr. J. C. Smith ; Hon. Technical Secretary, Mr. R. Copland ; Hon. Press Secretary, Mr. F. E. Wilson ; Hon. Records Officer, Mr. R. V. Bentley ; Mr. C. S. Rushbrooke ; Mr. R. Lawton ; Mr. G. Dunmore ; Mr. T. London.

The Society's Auditors for 1946, Mr. E. Keil and Mr. H. P. Costenbarder. Total votes cast, 15,727.

The Area Scheme

The Hon. Secretary reported the recommendations of the Area Committee. (See Area Committee Report.) Mr. Parker moved, seconded by Mr. Knott, "That the recommendations be accepted." Carried.

Mr. R. F. L. Gosling moved, seconded by Mr. A. Crips, "That seniors' fees be 2s. 6d. and juniors' 1s." Carried.

The suggestion from Mr. N. Gregory that the juniors' age be raised to 18 years was rejected by the meeting. The motion moved by Mr. T. W. Wickens, seconded by Mr. Johnson, "That the juniors' age limit remain 16 years of age," was carried.

Hon. Secretary's Honorarium

Mr. E. F. H. Cosh moved, seconded by Mr. E. Keil, "That the Secretary receives an honorarium of £20." Carried.

Fellows

The Council was invited by Mr. H. York to consider Mr. E. Keil, Mr. Paveley and Mr. F. J. Camm as nominations for Fellowship of the Society.

An Appreciation

Mr. S. Lanfranchi moved, seconded by Mr. T. London, "A vote of thanks to the Council for their efforts during the past year." Carried unanimously.

Affiliations

The Mersey M.F.C. and the Swindon M.A.C. were granted affiliation to the Society.

The "Vote of thanks to the Chair" was moved by Mr. T. W. Wickens, seconded by Mr. F. E. Wilson, carried, bringing the meeting to a close at 5.40 p.m.

MIDLAND AREA RALLY

The first Outdoor Rally will be held on April 28th, at Hockley Heath Aerodrome, at 12 o'clock sharp. Contests for Open Duration Petrol, Open Duration Rubber and Glider. 1st prize in petrol competition, petrol engine or equivalent in cash. Substantial 1st, 2nd and 3rd prizes in all competitions. All are invited to attend this rally. Details from B. J. Dennett, 96, Courtenay Road, Great Barr, Birmingham 22A.

BUSHY PARK M.F.C.

The above club have altered the date of their Gala day from May 5th to Easter Sunday, April 21st.

CHANGE OF TITLE

Pharos Model Flying Club (previously Pharos Model Aeroplane Club). Hon. Sec. : Mrs. A. M. Buckeridge, "Pharos," Blossom Way, Hillingdon, Middlesex.

CHANGES OF ADDRESS AND NEW SECRETARYSHIPS

Blackheath M.F.C. : Secretary, G. Hinkley, 15, Coleraine Road, Blackheath, London, S.E.3.

Harrow M.A.C. : Secretary, N. Gregory, "Almeida, 64, Wellington Road, Hatch End, Middx.

Mersey M.F.C. : Hon. Sec., J. H. Wilson, 24, Hall Drive, Greasby, Upton, Wirral, Cheshire.

Merseyside M.A.S. : Hon. Sec., W. A. Edwards, 9, Oldfield Road, Liverpool 19. Press Sec. : D. R. Hughes, in place of A. O. Sutcliffe.

Pharos M.F.C. : Hon. Sec., Mrs. A. M. Buckeridge, "Pharos," Blossom Way, Hillingdon, Middx. Hon. Competition Sec. : A. C. Armes, 259, Windsor Avenue, Hillingdon, Middx.

Sheffield Society of Aero-Modellers : Hon. Sec., A. S. Whitham, 41, Concord Road, Sheffield 5. Press Sec. : C. E. Exley, 11, Renshaw Road, Sheffield 11.

Swindon M.A.C. : Hon. Sec. : B. Gunter, 45, Pavenhill, Purton, Wilts.

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STRIP (3 ft. long)—1/8" sq. 2/- per doz., 1/8" × 1/4" 2/6 per doz., 1/8" × 3/8" 2/9 per doz., 1/16" × 1/16" 1/6 per doz., 1/16" × 1/8" 1/6 per doz., 1/16" × 1/4" 2/3 per doz.

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We have congratulated Mr. Patterson on his success and presented him with a cheque for £5 5s., which sum is annually awarded to the winner. His name will be suitably inscribed on the Barometer.

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is not in production as the Rubber Control are not yet able to release suitable rubber for its manufacture, but we hope all Aeromodellers will compete for this Trophy during 1946, using the best rubber procurable. If genuine SUPER-POWER AERO STRIP is permitted during this year, we confidently hope the winner will be able to claim a flight doubling the time of Mr. Patterson's.

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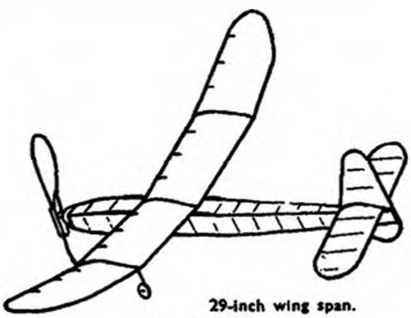

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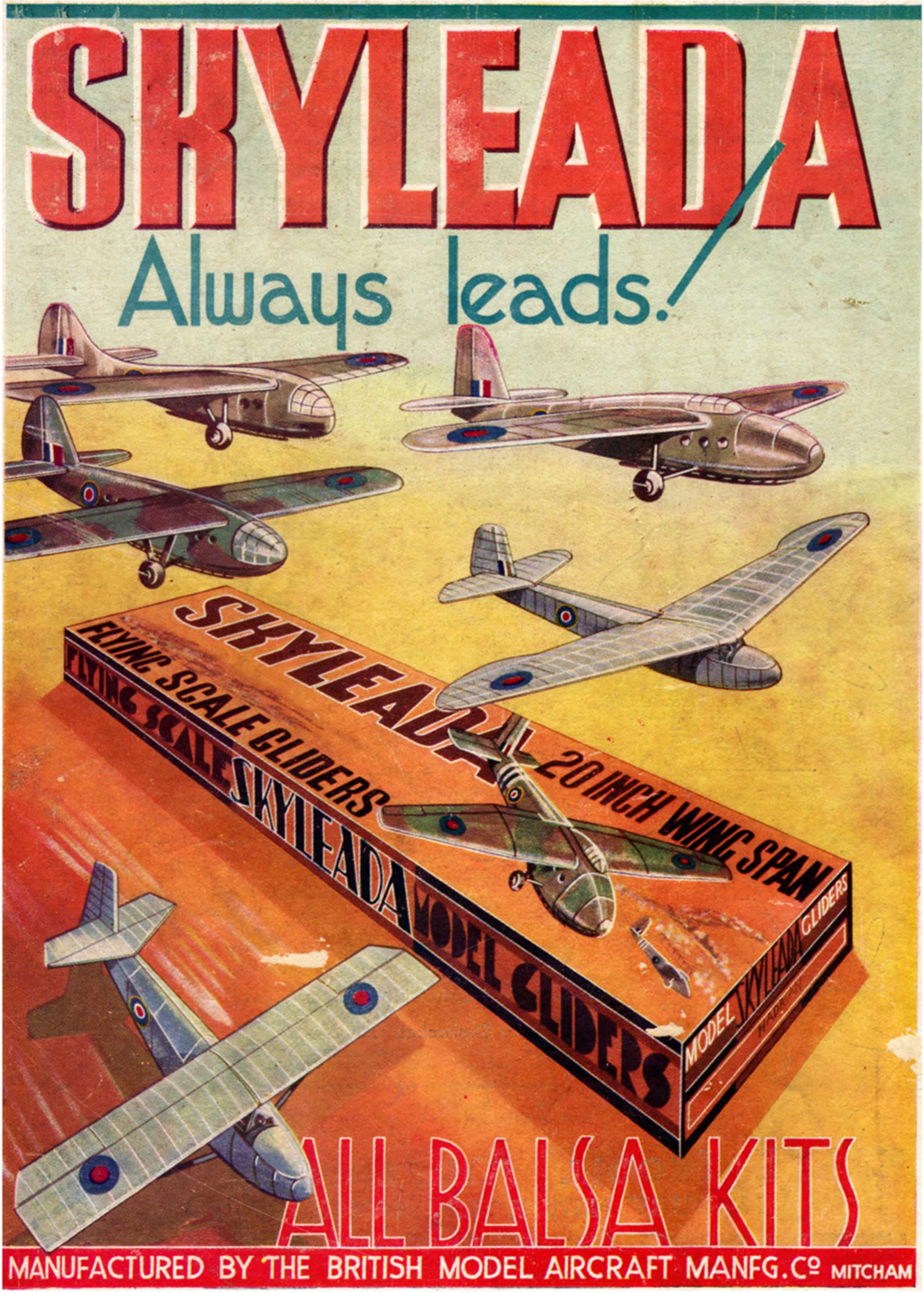
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