Sept 49

AUSTRALIAN model HOBBIES

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SEPTEMBER, 1949

International Wakefield — Race Car Transmissions — Queensland Champs — Chipmunk Controliner — Diesel Free-Flighter

Published by Model Aircraft Industries, 3 Percival Street, Glenelg, S.A., and printed by Specialty Printers Ltd., 155 Waymouth Street, Adelaide, South Australia. Australian Distributors: Gordon & Gotch (Aust.) Ltd. Overseas enquiries to publishers.

AUSTRALIAN Model HOBBIES

VOLUME I, No. 2. SEPTEMBER 1949

Managing Editor: W. WILTON-EVANS. Editor: W. G. FENNER. Art Editor: M. J. ROBINSON.

:: CONTENTS ::

A Sopwith Camel from World War I days, interpreted as a Frog 100 powered control-line model by Ted Ryan of the North Shore Model Flying Club, N.S.W. Those who saw Ted's 1948 Nationals entry, a Pfalz D12, will realise that no photos can do justice to his workmanship.

COVER PHOTO

PETER LARSON, a pioneer of Australian model car racing, with his Manx Meteor. Shown on the shelf is his 3 c.c. Special, built many years ago. Peter is Vice-President of the Riverside Miniature Car Club.

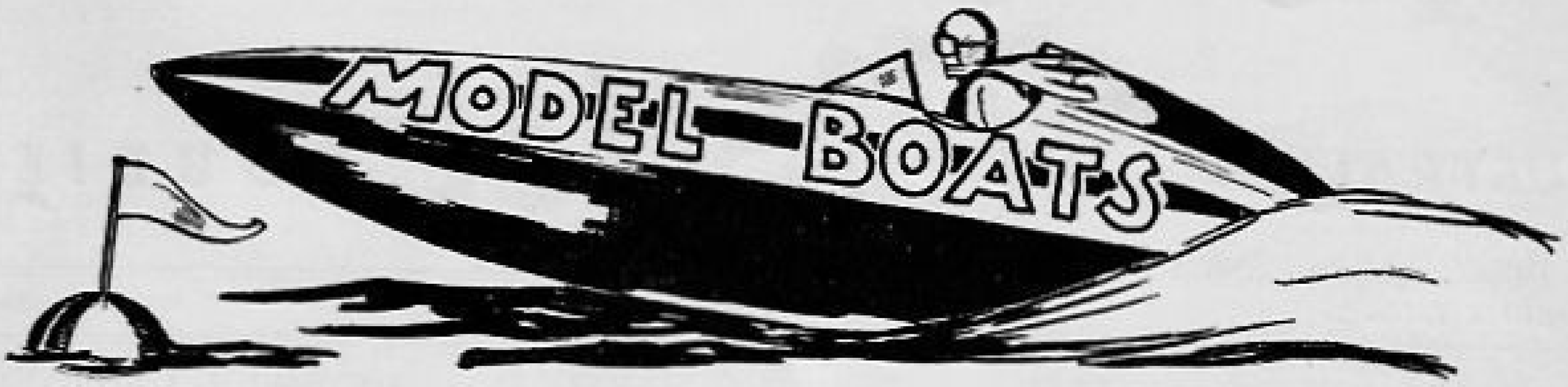
EDITORIAL

This month we make a plea to scale modellers, and the plea is this: Be a True Scale Modeller. By this we mean, leave no stone unturned to make your model as perfect a replica of the original as you can.

First, whenever possible acquire a working knowledge of the prototype by actual inspection. Then decide how large you must make the model in order to be able to model its parts. Next, draw or buy a drawing the full scale of the model you will build, deciding to what limits the working parts of your model will go.

Materials can usually be the same as the original, but when they are not available or are unsuitable, give some thought in choosing the most satisfactory substitute. In a recent radio programme a man described his hobby of model ship building. It was revealed that he took an average of four years to build each model, working five hours a day every day of the year. As an example of detail, the decking of his models each contained some 1,600 pieces of scale planking, 1-16 inch wide and 1-20 inch thick and ranging from ¼ inch to 3 inches long. Between all planks was placed a black fibre material, to represent the pitch in the full scale vessel.

While the above case is beyond most of us, it gives a standard by which to measure our own efforts.



The "Albatross" All-Balsa Yacht

The Albatross was first built several years ago, as an experiment in all-balsa model yacht construction, and proved most successful. The most important difference between balsa and hardwood, as far as the finished product is concerned, is that the closing of the large grain pores of balsa requires more care. It is achieved by following regular aeromodelling practices, similar for example to wing-polishing on hand-launched balsa gliders, and consists of generous use of sandpaper (glass-paper to those who wish to be correct) and filler, the latter being almost any cellulose skin, and one easily obtained is model aircraft dope.

In order to ensure good waterproofing, treat all parts with filler as they are made. When doing this, pin each part down on a flat board, laying greaseproof paper between board and the part concerned. Sand the part smooth, pin down as described, and paint on the filler. (As the time to dry is actually longer than appears to the eye, it is good practice to go on with the next part while waiting on the drying.) When thoroughly dry, reverse part, repin straight away, and dope the new side. When this is thoroughly dry sand both sides and repeat the doping operations. Continue to dope and sandpaper alternately, until there is a hard film of cellulose all over the surfaces and edges. At this stage give a final coat all over with banana oil.

Let us get straight into the construction

Commence with the keel, choosing hard straight-grained wood, and take care towards the bow that it does not split off along the grain. It would actually be an improvement to glue a sheet of hard 1-16 in. balsa each side for the bow portion, trimming to shape, with the grain running at right angles to that in the keel. Should this be done, stop the 1-16 in. sheet before reaching bulkhead number one.

After commencing the above treatment on the keel piece, we turn to the bulkheads. These are shown on the plan opposite, in halves; while it would be permissible to build them in halves—and in this way use scraps and offcuts which may otherwise be wasted—it is simpler to assemble if cut in one piece. (This is done by reversing the plan, carefully lining up the centreline, and marking off the other half. In the marking process, either prick through the full-size plan onto the wood, or better than this, use carbon paper between plan and wood, carbon side on the wood, and trace over the lines of the plan, using a ruler wherever the line is straight.)

When the bulkheads are drying, cut out the two side-planks of medium 1-16 in.—some may prefer to use 3-32 in. sheet here. Sand and dope both sides as above, and proceed to the garboard planks.

By now the keel and bulkheads should be ready to assemble, but before doing so cut the fin from light gauge brass. Scribe the shape as shown and cut out. The lead which is attached to the bottom of this can be filed from a solid lump, or you may care to try your hand at casting it. In the latter case the mould can be made in wood—hardwood, balsa is not satisfactory as it burns away while the lead is still molten and so the shape is lost. Another method is to shape the keel weight in balsa and build a plaster-of-paris mould around this (give the balsa a good coating of shellac before using the plaster-of-paris). Cut the balsa block away from within when the mould has hardened and cooled—there is an exothermic chemical reaction when water and plaster-of-paris are mixed—and pour molten lead in its place. If more than one casting is required it will pay to make the plaster-of-paris mould in two pieces joined along the longitudinal centre line; it can then be bound together when pouring and separated to get the casting out. Otherwise the mould may have to be broken should the lead not come out when gently tapped.

Rivet the lead to the brass fin by slotting the lead as shown, drilling two holes right through lead and brass, and using soft copper rivets. It may be possible to solder the lead to the brass, but this is not as easy as may be thought, and we advise against it as the lead may flow and lose its shape.

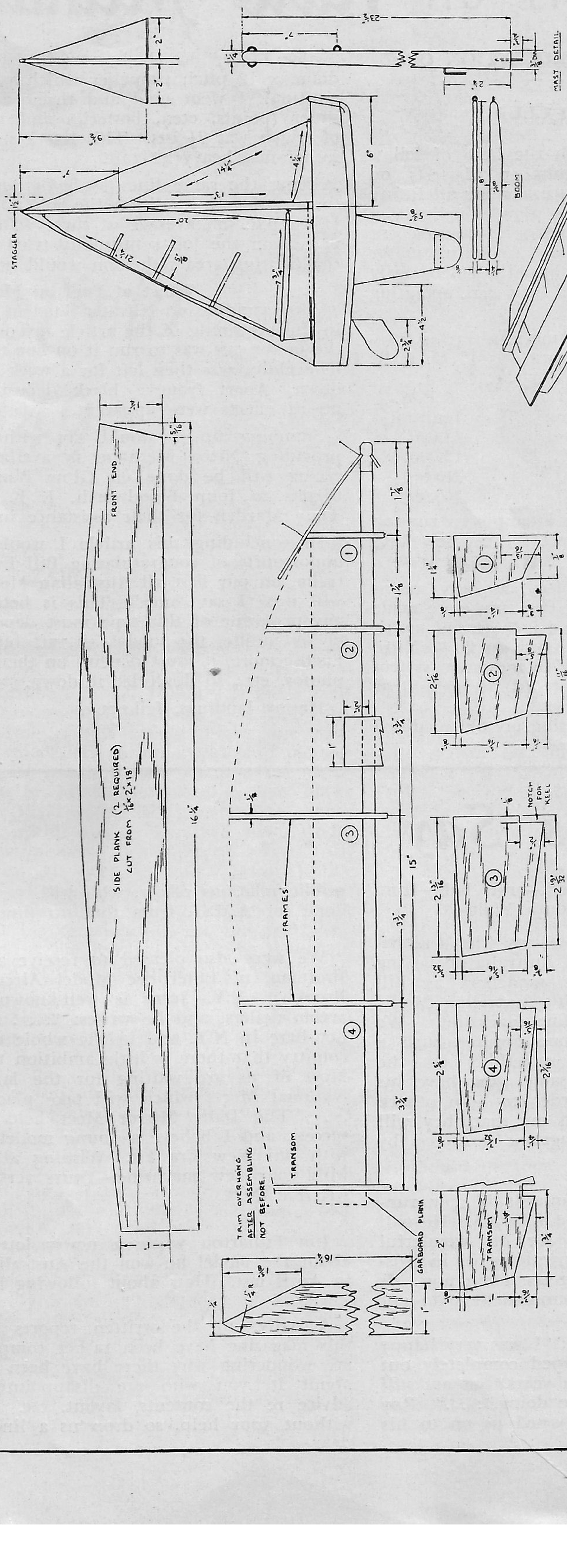
Drill a series of four holes 1-32 in. diameter on a line ¼ in. from the top edge of the fin, and about ¾ in. apart. Now commence assembling the bulkheads on the keel, using a copious glue supply. Fit the brass fin in place along one side of the keel and extending from just ahead of bulkhead three back towards bulkhead four. Press pins through the holes in the brass, right through the keel, and turn over on the other side. Take great care to line up all bulkheads and pin them to the keel. Straight away assemble the two side planks, commencing at the bow and proceeding towards the stern, glueing and pinning both in position, bulkhead by bulkhead, at the same time to avoid distorting the keel. Once again trim up all the bulkheads and see none are askew or out of position, put more glue on all joints, and leave aside to dry very thoroughly.

Turning now to the mast, sail, and other fittings, choose any part and make it to the dimensions given on the plan. For the mast and boom use the hardest, straight-grained balsa available—the so-called "jarrah" variety if available—and sand and dope as before. To make an attractive model, paint these fittings before giving the final coat of banana oil; we suggest red for boom and mast, dark blue for decking, silver for deck fittings such as tiller, red for sides down to the water-

(Continued on page 22)

AUSTRALIAN MODEL HOBBIES

THE 'ALBATROSS'
AN EASILY BUILT-UP
ALL BALSA YACHT



A REPORT ON Nitro Methane

MODEL AERONAUTICAL ASSOCIATION OF NEW SOUTH WALES EAST COAST SPEED CLUB

During the last two months with the help of fellow club members, I conducted a number of tests on Nitrated Methanol fuel to decide once and for all future policy regarding the use of spark or glow plug ignition for speed work. At this stage it must be pointed out that the tests were conducted on my .65 racing motor and that the performance variations would not necessarily apply to other motors, particularly if they were operating with different compression ratio.

Airscrew used was a standard American racing propeller, 9" diam. x 14" pitch and plug was ¼" O. & R. Glow Plug, compression ratio approximately, 12 : 1.

Fuel	R.P.M. on Glow Plug	R.P.M. Ignition
1. 3-1 Methanol Castrol R.	12,500	13,000
2. 6¼% Nitro Methane ..	13,000	13,000
3. 12½% Nitro Methane ..	13,250	No test
4. 25% Nitro Methane ..	13,500	No test

Pre-ignition was apparent during attempts to run on ignition so I gave it away in respect for my few VR2 racing plugs.

R.P.M. figures are naturally approx., as only means of counting was a vibratac, and only two runs were made on each fuel. In my other .65 cubic inch racing motor 14,000 r.p.m. was obtained on a mixture of 20% Nitro Methane. This motor has an improved induction system being the one which was placed first (1st) in class D at the Australian Nationals.

Last week we made a flight test using my old modified "Snow Flake," which is now in bad shape, using a 9 diam. x 12 pitch propeller which yielded 103 m.p.h on ignition. I went mad and threw away coil, condenser, timer (points, etc.), batteries and wiring, total weight of which was 7½ ozs. This left a somewhat lighter and rather nose-heavy aircraft.

Using the same lines as before and without altering the nose-heavy condition the job was taken off to clock 117 m.p.h. (an average of three watches). Strange as it may seem the job continually tried to climb indicating that a wing area reduction would not go amiss.

Effect of Fuel on Motor

After running on Nitrated Fuel in the tests mentioned in the beginning of the article my only attempt to clean the motor out was to run it on one tank of straight fuel. The motor was then left for a week before pulling right down. Apart from a black deposit on piston crown no ill effects were apparent.

Summing up, I would say without hesitation that providing Nitro Methane is available to me, future racing will be done on Glow Plug ignition. Many thanks to John Bloodworth, J. B. Scott (Scotty) and Tony Marden for their assistance in running the tests.

In concluding this article I would like to take this opportunity of congratulating Bill Evans, of South Australia, on our first all Australian Model Magazine. You will note I say "our." This is because the success of any magazine of this type must depend on the support of its public, the model aircraft builders of Australia. Furthermore, it must depend on them for articles, ideas, photos, etc., so don't let it down.

Happy landings, fellows.

BILL MARDEN.

Our Readers Say . . .

Pleasing indeed is this comment—and help—from Speedman Tony Marden of New South Wales.

". . . Before giving out any news of my Club's activities I feel I must congratulate South Australia on having such enterprising and enthusiastic modellers as Bill Evans and all those connected with "Australian Model Hobbies," on putting out such a fine magazine. We here in New South Wales have long awaited such a publication which really can do something for the enthusiastic modeller, and at the same time have his own ideas and plans printed in order to help others. The boys in my Club have assured me that they will help in every way to make the magazine a success by sending in articles, photos, etc."

Famed pre-war builder Roy Marquardt is now running the Marquardt Aircraft Co. in California. He will be remembered by older builders for his wonderful stick jobs, copies of which were very successful in Australia, but for some reason we never see them now. Is is because the new generation of aeromodellers do not know of the type?

In answer to our letter Roy wrote: "I was very happy to receive your letter. I have dropped completely out of the model game in the last seven years, but am still interested to hear what the boys are doing. . . ." Roy is naturally a busy man, and has passed us on to his public relations officer, who will, we hope, let us have dope for A.M.H. from time to time.

We were also pleased to receive a letter from Jerry Brofman, of Enterprise Model Aircraft & Supply Co., Brooklyn, N.Y. Jerry is well-known to all confirmed aeromodellers, and he writes: ". . . At present it is so hot here in N.Y. and in the whole eastern part of the country that there is little ambition to do any building. Most of us are waiting for the large Plymouth and National Meets which will take place in a few weeks. . . . The Daily Mirror Meet held here was a huge success, and I believe a young modeller took first place with our New Era kit. Wishing all luck and success with your new magazine.—Yours very sincerely, JERRY BROFMAN."

Jim Fullarton wrote a newsy letter some time ago about the model he won the Australian Wakefield with in April last. How about following it up Jim?

Actually, all the written reports we've received on this magazine have been rather complimentary, and we are wondering why there have been no attacks. What about it, you who are disappointed or have some advice re the contents, layout, etc. We can't improve without your help, so drop us a line or two.

The World Wakefield 1949

COURTESY
FRANK ZAIC

Here is A. S. Ellila, of Helsinki, Finland, holding the ten-years-old model with which he won the 1949 Wakefield Contest at Cranfield. As stated by Frank Zaic in the article on this page, the model follows typical Swedish practice of the period, notably, a simple slab-sider, parallel chord wing with low dihedral, large fin and small propeller. The building and covering appears very neat and apparently Mr. Ellila knew the model very well indeed.

Introduction: Australian Model Hobbies is more than proud to be able to present this article by Frank Zaic, Chairman of the American Wakefield Team this year, one of the leading modellers in the world, and pioneer of model aeronautics publications. All pre-War aero-modellers will know his Model Aernonautics Year Books for 1934, 1935-36, 1937 and 1938, outstanding books acknowledged the world over. In 1943 his "Model Glider Design" was published, while Frank served with the (then) U.S. Army Air Corp, in Italy. Jasco (Junior Aeronautical Supply Company, of 203 East 15th Street, New York) products are almost as well known as Frank himself, and reflect his conscienciousness and specialisation. Now we present his story of the 1949 Wakefield International Contest held at Cranfield, England, on Sunday, 31st July, 1949.

"Twenty-two countries and over ninety models competed in this year's Wakefield.

"After a week of fine weather, the 31st dawned to find high wind velocities and gusty conditions, making flying most difficult, especially since most models were trimmed for fair weather flying and there was no time for trimming to the high wind. Consequently the mortality rate was very high and it was very difficult to get a decent take-off. If the take-off was good then there was a downdrift in the middle of the field which cut down times. Also, the wind was normally high enough to take a model out of sight.

"A. S. Ellila, the winner, of Finland, is a twenty-six years old chemistry student. The model he used was built ten years ago and followed the Swedish design of that period. It has won several meets by consistent flying. He has built other models since then, but this was his most reliable. Evidently the low power and small propeller and low initial power burst carried his model safely through the ground gusts level. Models with high power swung upward and were blown backward unless they had extraordinary amount of power and were capable of almost straight up climb.

"In case you have not received the results, here are the first five places, together with those of the Australian models; times are the average of three flights:

1st—Ellila, A. S., Finland, 183.3 secs.
2nd—Sadorin, E., Italy, 179.9 secs.
3rd—Fletcher, W., U.S.A., 179.8 secs.
4th—Naudzius, E., U.S.A., 177.43 secs.
5th—Loates, F., Canada, 157.3 secs.

Australia

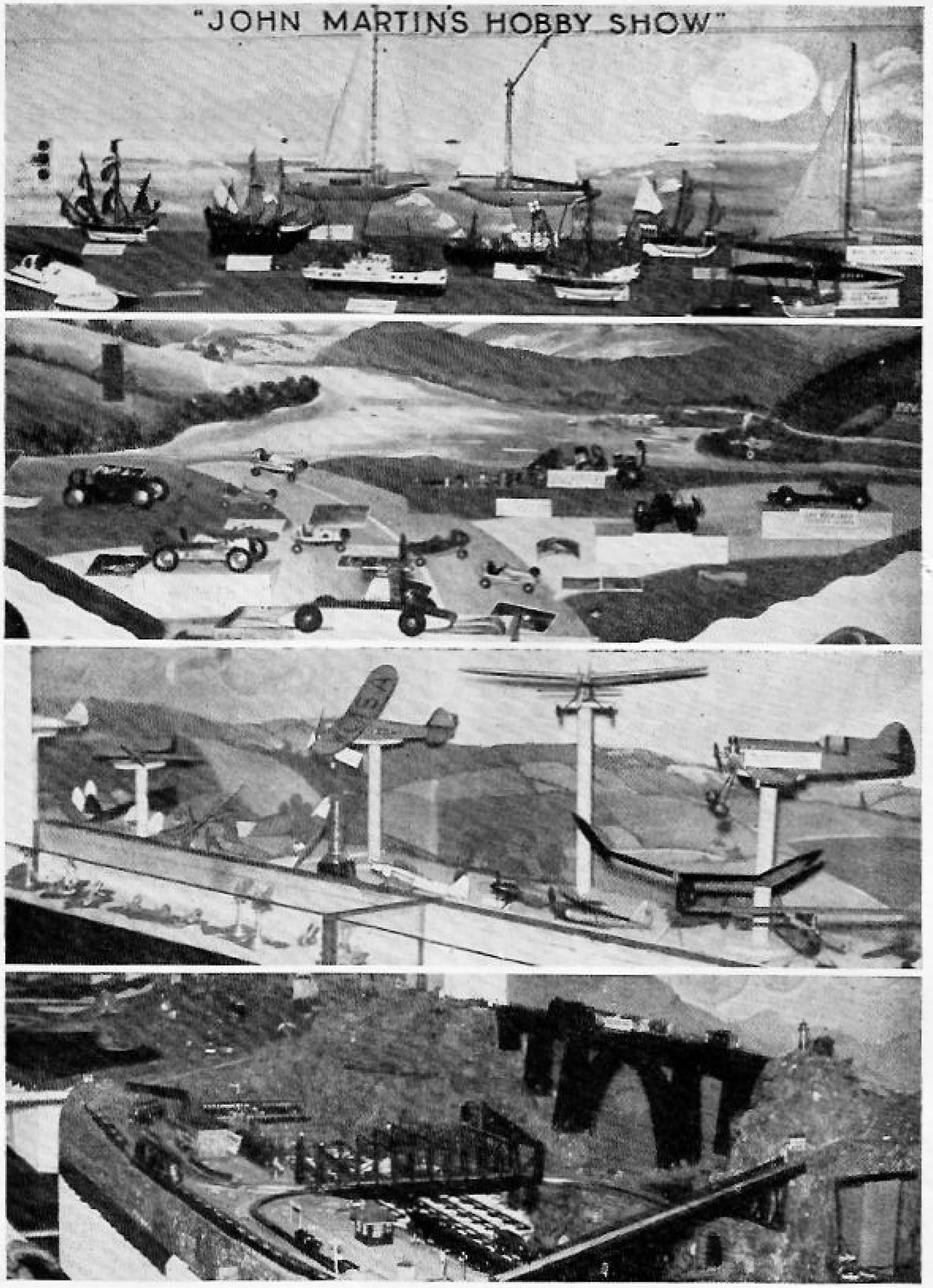
15th—Lim Joon, A. K., 123.27 secs.
25th—Fullarton, J. M., 98.63 secs.
47th—Gregory, E. O., 61.8 secs.
61st—Felstead, B. N., 41.83 secs.
73rd—Rowe, R. S., 27.0 secs.
85th—Meader, A., 2.93 secs.

"The specifications of the winning model are:—

Weight: 10¼ ozs.
Wing area: 209.5 sq. in.
Wing span: 46.7 in.
Stab. span: 22 in.
Fuselage length: 39.75 in. overall.

(Continued on page 11)

"JOHN MARTIN'S HOBBY SHOW"



The first of what is hoped will be an Annual Hobby Show was run by John Martins Store, from June 11th to June 25th, an exhibition conspicuous for good lighting, layout, variety and quality. Models arrived from country centres as well as from all parts of the metropolitan area. As seen in the accompanying photos, topical murals were supplied for each hobby section, and despite the fact that due (unfortunately) to the general apathy of exhibitors it was impossible to foretell how many models would arrive, and how much space would be required, nevertheless the areas allotted were pleasantly filled.

It was in the nature of an experiment, and everyone agrees it was a great success, so much so that a bigger and even better Show is probable next year—plans even include a regular race-car track—when we may attract the best of interstate hobbyists' work, culminating in contests at the end of the Show period. This at least is an idea, and is presented for your comments, especially interstate readers and possible exhibitors.

On page 6 we have four panoramic views of the main sections represented, model aircraft, cars, boats and railway. There were, of course, far more models present in each section—barring model railways—than shown in these photographs, but a close examination will reveal the large number of types, including stunt and speed controline, freeflight, flying and non-flying scale, tail-less soarers, Wakefield and open rubber-powered model aircraft; speed and scale model cars; scale ships from 16th century galleons to modern tramp and passenger carriers, yachts and speedboats; and although the model railway section comprised one big layout only, it contained a variety of scenery and track, and had electric locos and rolling stock of both O and HO gauge.

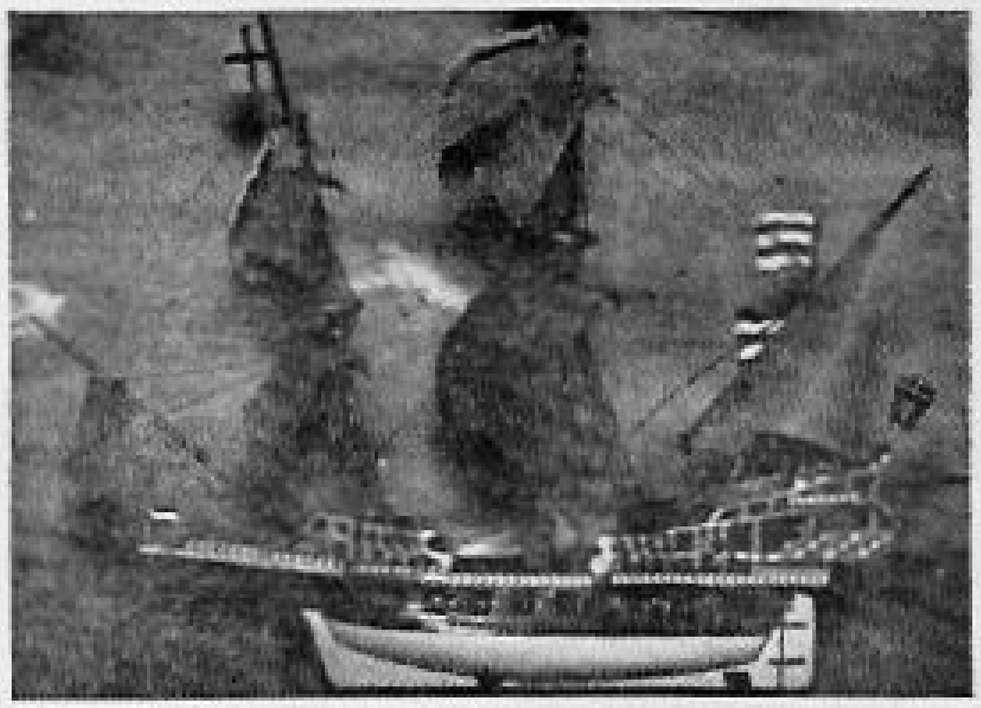
Two novel and highly popular items were the moving pictures shown continuously at peak periods, giving the public an inkling of the potentialities of the various model planes seen at the Show; and the built-up circle round which a model race car was run and R.T.P. Jetex-powered models flown—the latter in particular were spectacular.

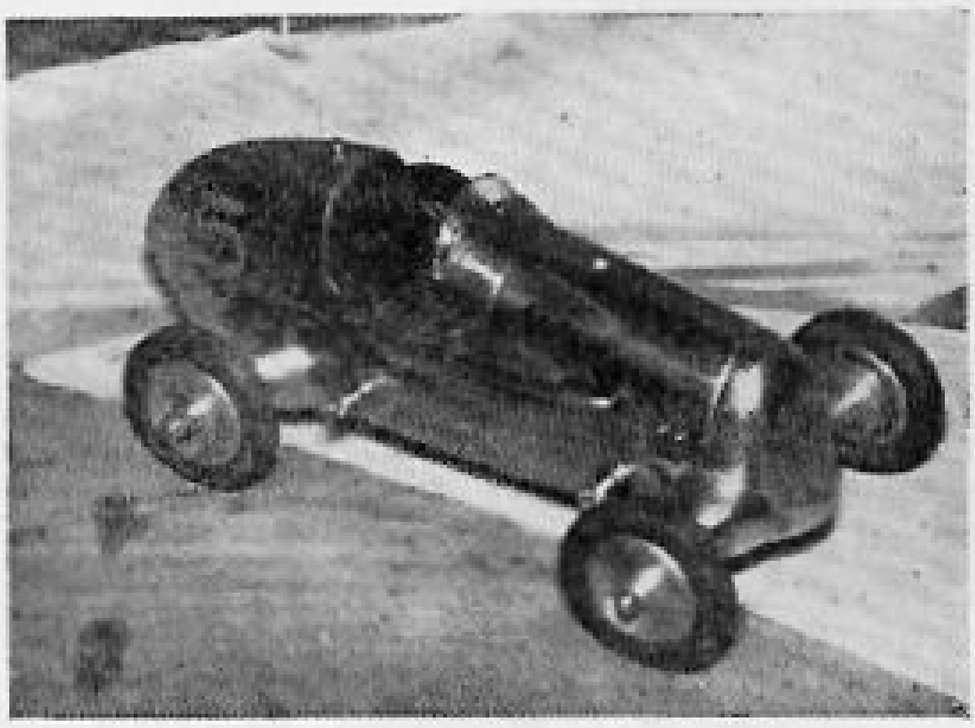
Getting down to individual models and personalities, anyone attempting to choose a "Best Model of the Exhibition" soon realised the impossibility of comparing not only different sections, but in certain cases even different models within the one section. There just is not a suitable criterion for comparison, for even where most will agree on workmanship being a prime consideration, we find such variables as tools and materials available, age of builder, time taken to construct model, and so on. Nevertheless we had little trouble in picking out some of the most outstanding models, and will commence with two by Geoff. Sowden, viz. a rubber-powered flying-scale of the Fairchild "Argus," and a prototype sports car incorporating the builder's choice of features from several full-size vehicles. The Fairchild is shown on this page, and we assure all our readers that the closer one gets to that model the better it becomes.

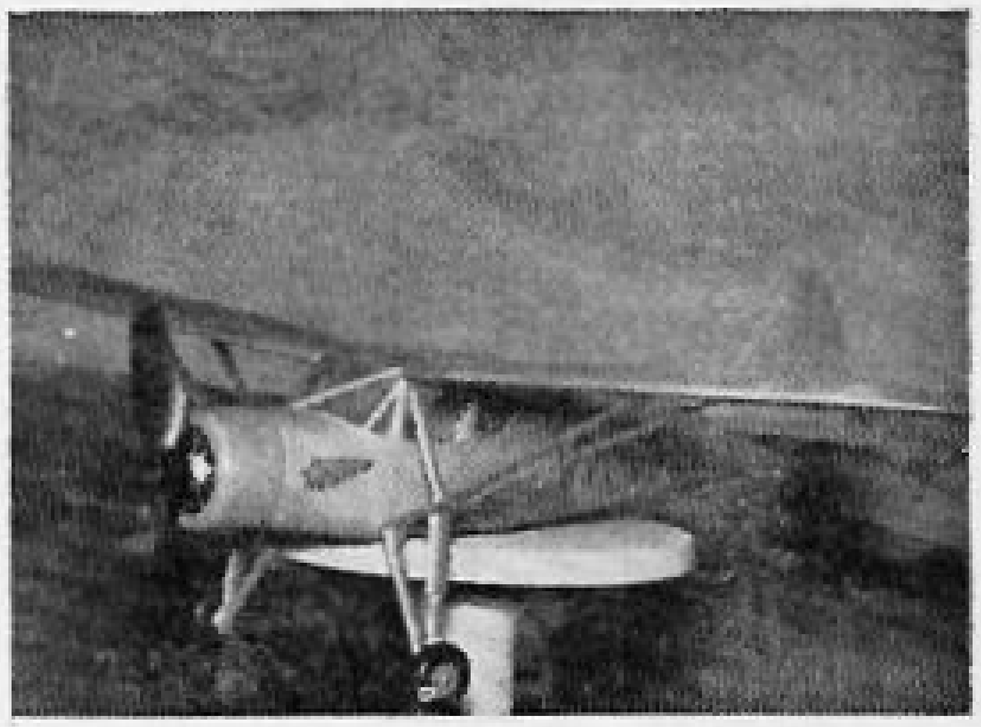
Such little hidden internal fittings as always occur in scale models are beautifully made and assembled, even though never intended to be seen. All aero-modellers welcome Geoff. back to the fold, hoping to see his hand turned to free-flight gas and rubber once again. The fine detail in his uncovered car is on a par with the Fairchild, and space will not allow us to give a description worthy of it.

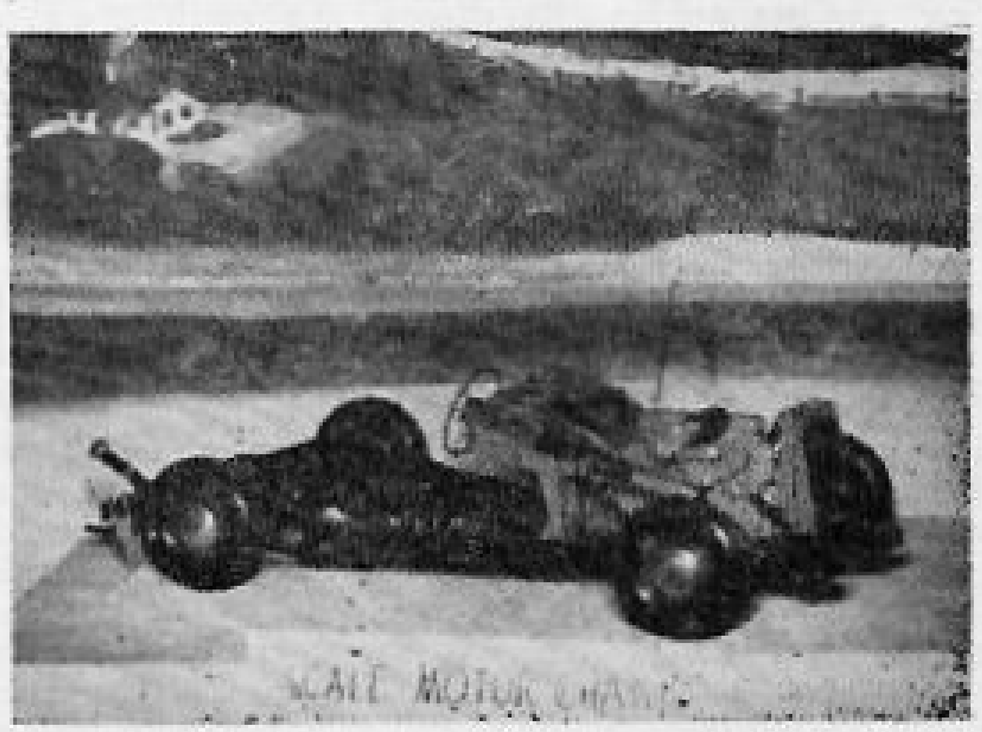
Merv. Robinson, our Art Editor, exhibited a very fine collection of non-flying scale models of fighting aircraft from the two World Wars, from the S.E.5 to Spitfires and Hurricanes.

(Continued on page 13)









FOR 2 C.C. AND 5 C.C. DIESELS

The "Chipmunk," one of the first products of De Havilland's Canadian Division, is the aircraft selected to replace the most famous of all primary training aircraft, the D.H. Tiger Moth, in which almost all the Commonwealth Air Force's pilots trained during World War II.

The general proportions of this attractive aircraft immediately suggest to the control-line builder its suitability as a scale model.

As the amount of work various modellers are prepared to put into control-line models differs considerably, alternative types of construction have been suggested in our plan, and you may choose that which appeals the most.

Only a relatively brief constructional description is given as the accompanying plan is fully descriptive.

While for most advanced aerobatic flying, 5 c.c. to 10 c.c. engines are usually chosen, the small 2 c.c., or thereabouts, seem most suitable for scale work.

As the scale of one inch to the foot gives us a model of 34 inch wing span, and wing area of 172 square inches, we suggest that if built lightly these smaller motors will provide sufficient power for good flying.

CONSTRUCTION:

Three types of fuselage construction are illustrated.

The built-up, former fuselage, for those who seek true scale appearance, is naturally the most difficult. Cut formers from medium sheet stock of indicated thicknesses, and mount between two fairly hard sheet sides as shown in the small exploded view. Wait till well dry and then cover with soft sheet, cutting slots for control rod and elevator. Use cellophane or thin celluloid for cabin. Glue motor mount very firmly to formers F1 and F2. The fuel tank (stunt type) is mounted on the M.M. between F1 and F2. Cover entire fuselage with tissue and dope several times. See that the rudder is offset to the correct side and glued.

For those desiring more rapid construction with still a fair scale appearance, cut two $\frac{1}{4}$ inch sheet side profiles (leave off cabin and build it up later) and two plan profiles (allowing for side thickness) of soft $\frac{1}{2}$ inch sheet. Glue together, shave and sand off corners. Mount fin, rudder and tailplane as others; use M.M. similar to above.

The simplest fuselage is a single hard $\frac{1}{4}$ inch sheet profile. Build up motor mount as drawn and glue heavily.

Wing, controls, rudder, fin and tailplane are identical for all fuselages. Mount the bellcrank pivot firmly on centre-section of wing, and the U/C as drawn.

Experts will probably differ on their choice of propellers, but that shown (for the E.D. or "K"2) is good and simple—note typical cross-section. Don't forget to put the loop in the fuel line as explained in the previous issue of A.M.H.

Mount a wire tail skid for simplicity, though the original has a small wheel. Use plenty of glue when mounting wing to fuselage (after covering and doping wing), and don't forget the guide plate at the tip rib.

Make careful selections of wood used throughout, having in mind the functions of each part and remembering that with the small motors especially, light weight is essential. As always, we advise using steel lines if you are a reasonably experienced controline flyer, but cord lines for beginners. Watch the older fellows and get what hints you can from them, on lines, line connections and line handling, as well as actual flying.

(Continued on page 28)

SCALE IN INCHES 6 5 4 3 2 1 0 ½ 1 2

BIND UNDERCARRIAGE LEGS TO LEADING EDGE & GLUE FIRMLY OR--- BIND WITH RUBBER AS SHOCK ABSORBER (PROVIDE WIRE GUIDES)

SUGGESTED PAYNE-TYPE PROPELLOR

COVER WING WITH SILK TISSUE OR JAP. TISSUE

SOFT 1/8" SHEET

GUIDE PLATE OF 1M.M. PLY

L.E. FROM 1/8" HARD BALSA

MAIN SPARS OF 1/8" x 1/2" MEDIUM

2¼"

R. 1 1/8" R. 2 1/8" R. 3 1/16" R. 4 1/16" R. 5 1/16" R. 6 1/16" R. 7 1/16"

COVER FUSELAGE WITH LIGHT, STRAIGHT-GRAINED 1/16" SOFT BALSA. THEN COVER ALL-OVER WITH TISSUE & DOPE WELL.

T.E. BUILT-UP FROM 1/16" MEDIUM SOFT

WING

1/8" MEDIUM SHEET RUDDER

FIN

A THIRD METHOD OF FUSELAGE CONSTRUCTION. CUT SIDE PROFILES FROM 1/4" MEDIUM BALSA, TOP & BOTTOM FROM 1/2" SOFT. GLUE. SHAVE OFF CORNERS & SAND.

1/4" SQ.

CONSTRUCTION OF PROFILE VERSION

HARD 1/16" SHEET

HARDWOOD

BULKHEAD FOR E.D.

BULKHEAD FOR "K" 2cc.

F.1 F.2 F.3 F.4 F.5 F.6 F.7 F.8 F.9 F.10 F.11

BLOCK (SOFT BALSA)

1/16" 1/16" HARD 1/16"

M.M.

DIAGRAM SHOWING METHOD OF ASSEMBLY

FUSELAGE (BUILT-UP VERSION)

BALSA FAIRING

CARVE COWLING FROM BALSA BLOCK

1/16" ALUMINIUM OR DURAL BELL CRANK

2" DIA. AIRWHEELS

9"

FRONT VIEW OF PROFILE VERSION

COVER WINDOWS WITH THIN CELLULOID

DROP-OFF OR FIXED U/C OF 7/64" PIANO

GLUE RUDDER OFF-SET THUS

1/10" DIA. ALUM.-WELDING ROD

1/8" DIA.

HARDWOOD BEAM MOUNT FOR E.D. MK.II. IF USING DIFFERENT MOTOR MAKE MOUNT TO SUIT.

2 3/8"

HARD 1/4" BALSA

HARD 1/8" SHEET

1MM. PLY

18 S.W.G GUIDE

U/C LET INTO HOLES (BUSH IF DESIRED)

FUSELAGE (PROFILE VERSION)

3/16" PC.D. 1/8" DIA. HOLES

3/16" 1MM. PLY

1/8" MEDIUM SHEET

TAILPLANE

1" 1/2" 1/4"

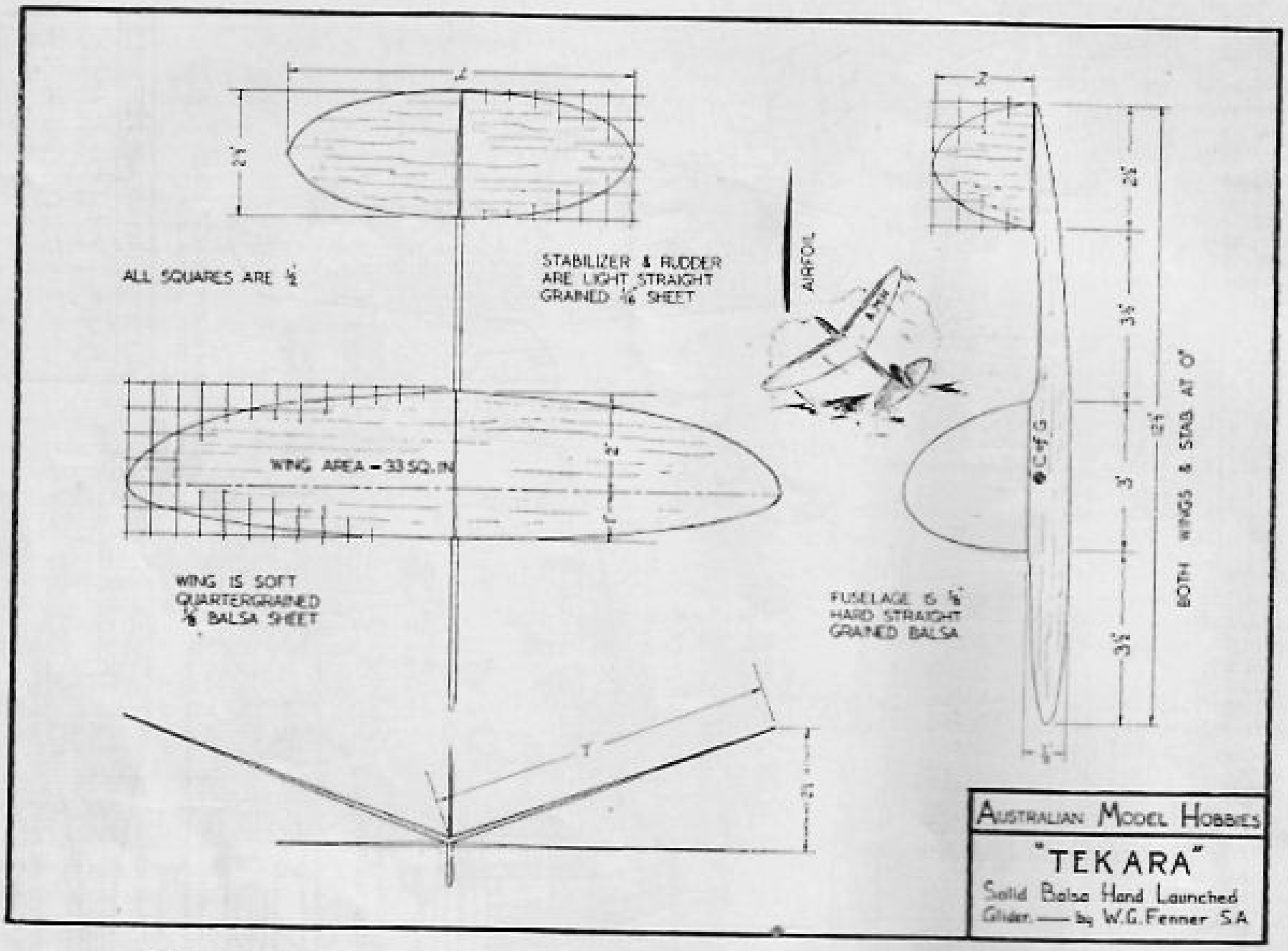
LINEN HINGES KEEP GLUE & DOPE AWAY FROM JUNCTION OF ELEV. & STAB.

AUSTRALIAN MODEL HOBBIES

DHC-1 "CHIPMUNK"

A REALISTIC CONTROLINER

ADAPTED FOR A.M.H. BY: W.G. FENNER.



HAND-LAUNCHED BALSA GLIDER

A MODEL BUILT FROM SOLID SHEET WOOD AND IS IDEAL FOR THE NEWCOMER

This class of model, called "Chuck" or "Hurl" gliders in post-war days, is not as popular now as ten years ago, presumably due to the predominance of power flying and the abundance and range of low-priced engines coupled with the glamour of noise and ether vapour. But be not mistaken, hand-launched solid balsa gliders, to give them their original name, are an interesting class, can give durations equal to the best gas, rubber or tow-line models, (one S.A. model flew for over an hour way back in 1939) and have difficulties of building adjusting and launching on a par with any other section, except perhaps Wakefields.

The model given this month is about the simplest which can give reasonable performance. It will cost only a few pence and take but a few hours to build.

Commencing with the mainplane, select a sheet of ⅛ sheet which is hard and still as light as possible. With a piece of pencil-carbon paper between this page and the wood (carbon side down!) trace carefully round the wing plan, using a ruler along the straight portions of the leading and trailing edges. The opposite half is, of course, continued on from the straight end of the first half.

Using a sharp knife, a leather cutting blade is good, cut around just outside the line on the wood, then sandpaper to the line using a wooden sandpaper block. With the wing now of correct plan form, slightly round the under surface of the leading edge, followed by a similar rounding of the upper surface only more so—see drawing. For these operations use fairly fine sandpaper or too much wood may be removed. It is most important that the L.E. is rounded and not a sharp edge. Proceed now to the most tedious job, namely shaping the rear part of the airfoil. This can be done with a fairly coarse sandpaper at first, followed by finer grades for finishing. Do not fall short on this operation as on it depends to a large extent the success of this model.

Now sandpaper all over with 00. Re-mark the centre section on the wood and cut a fine "V" in the upper surface, almost the full thickness of the wing, to allow dihedral to be built in. Pin one side to a board, on which is lying a piece of greaseproof paper, greased side up, put a copious supply of fairly thick glue in the "V" just cut, and bring the other half of the wing up so that its tip is three inches off the board. Support the wing in this position, pinning down the inner part to ensure both halves have zero incidence with respect to the board. Leave to dry for twenty-four hours.

The fuselage is cut from very hard straight-grained ⅛in. sheet. Mark out the profile with carbon paper, being very careful with those parts on which the wing and tailplane are mounted, for it is most important that these portions be exactly straight and parallel. It has been found good practice to use the edge of the sheet of wood for these mountings. Cut around the fuselage and sand to line as with the wing. Now round off the edges except on the wing and tailplane mountings, which are left perfectly flat. Intermittently dope and sand the fuselage until it has a water-proofed surface.

Sand a sheet of one sixteenth light, straight-grained wood, and trace and cut the tailplane and fin from it; sand to the lines and gently round the edges—except the bottom (flat) edge of the fin. Pin the tailplane to a board and glue the fin to it at the centre, lining it up carefully to both the vertical and dead fore and aft.

With the wing dihedral joint dry, give two coats of light dope and sand. Now carefully push three short pins (bills) through the glue of the joint. Put a heavy layer of glue on the wing mount part of the fuselage and pin the wing on fimly, putting the combined wing and fuselage upside down until dry—check the fuselage for uprightness several times during the early stages of drving. When dry (12 hours) put a strip of glue down either side of the mount underneath the wing, and again set aside for at least 12 hours to dry.

Finally mount the combined tail unit in place, being sure the fin is exactly fore and aft, and by putting the model once again upside down on the board measure the distances that each tip of the tailplane is above the board. These should be equal, so twist it round until they are and then leave to dry.

Before gliding, check all surfaces for warps, taking out any present by brushing on a thin layer of dope and twisting that portion beyond the correct position until almost dry.

Do go to the trouble of walking to your flying field before test-gliding, as backyards are as fatal for these as for other models. Commence with gentle launches from three to four feet off the ground, and trim for a gentle circle to the left (for a right-handed person) by warping the T.E. of the fin and elevators slightly. Use a little plasteeene on the nose to correct any stall, but do not do so until the model is first circling well. A little practice soon teaches one to get quite long test glides from even a few feet of altitude.

Now commence gentle launches with the arm held extended, as when bowling a cricket ball, releasing the model at the top of the throw and being sure it is held in a right bank (again for a right-handed person). This type of launch has been found safest to start with. If the model has no spinning tendencies from these launches, start on the real hurling launch, quietly at first, checking any faulty adjustment, and working up until one's whole strength goes into it.

The ideal at which to aim is for a steep right circle from the launch, pulling round into wind at the top and from then on gliding in a gentle circle to the left of about 200 ft. diameter. (A tight circle is soon found to be critically near a spin, and it will usually do so if the model contacts a thermal).

When flying the model again later, always check with gentle launches first in case warps have developed. If you are interested in this type of model, write in and let us know, and we will then proceed with more advanced models and descriptions of more advanced flying techniques.

THE WORLD WAKEFIELD, 1949—

(Continued from page 5)

The motor consisted of two lengths with return gear in the rear. The propeller is 16 inches diameter and about 21 inches pitch. Power is 14 strands of 3-16 in. Dunlop. Normally he could wind more, but on the day only wound about 1,200 as he had just put in new motors."

Editor's remarks: Congratulations Finland. This is the fourth country ever to win this most coveted trophy, and it is good to see it go to a new land. Let us hope that a capable array of models is sent next year to Helsinki, and that Australia has its name high up. Why not start building for it now?

As the results show, the Australian models as a whole did not show up very well. This is, under the circumstances of bad weather and proxy flying, to be expected—with no reflection whatever on the fliers, as we are sure they did a good job. Allan Lim Joon is to be congratulated on his quite respectable average of over two minutes, while Jim Fullarton's 98 second average is reasonably high. The other times serve to indicate how tough the conditions were; our guess is that Arthur Meader's model was swept up and over in a half loop, being too damaged to be flown a second time.

Of the five placegetters, the only name we recognise is Ed. Naudzius. Ed. won the Nationals Trophy in 1938, and has been high up in U.S. rating for many years. Of course, the winner and second are almost certainly well known in their own countries, but unfortunately there is still insufficient news exchange to know them well.

England, it will be noticed, did not place in the first five. Their team was decided as follows, together with their times at the Eliminations on July 2nd:

	1st	2nd	3rd	Total
1. Chesterton R. B., Northhampton	355.5	322.4	472.1	900
2. Holland, F., Swansea	203.5	364.0	317.8	803.5
3. Smith, E., Icariaus	201.0	344.3	322.2	801
4. Warring, R. H., Zombies	378.6	132.75	333.3	732.75
5. Hinks, R., Luton	304.5	320.5	128.8	728.8
6. Clements, R., Luton	235.5	183.5	311.9	719

These Eliminations were flown off in excellent flying weather, and it will be interesting to hear where this redoubtable team placed.

1949 AUSTRALIAN CONTROL-LINE AND FREE FLIGHT CHAMPIONSHIPS

to be held in Adelaide on

9th and 10th OCTOBER, 1949

FREE FLIGHT (Sunday, 9th, at West Beach)

GAS OR DIESEL FREE FLIGHT

Three official flights—All R.O.G.

$$\text{Ratio System} = \frac{\text{Total Duration}}{\text{Motor Run}}$$

Maximum flight time—10 minutes per flight.

Weight Rule—same as that set down for the 1950 Australian Nationals.

OPEN RUBBER—No weight rule.

OPEN SAILPLANE—No weight rule. F.A.I. towline.

OPEN HAND-LAUNCHED GLIDER—No weight rule.

CONTROL-LINE (Monday, 10th, Glenelg)

OPEN STUNT

CONSOLATION STUNT

OPEN SPEED—Any size or type of motor.

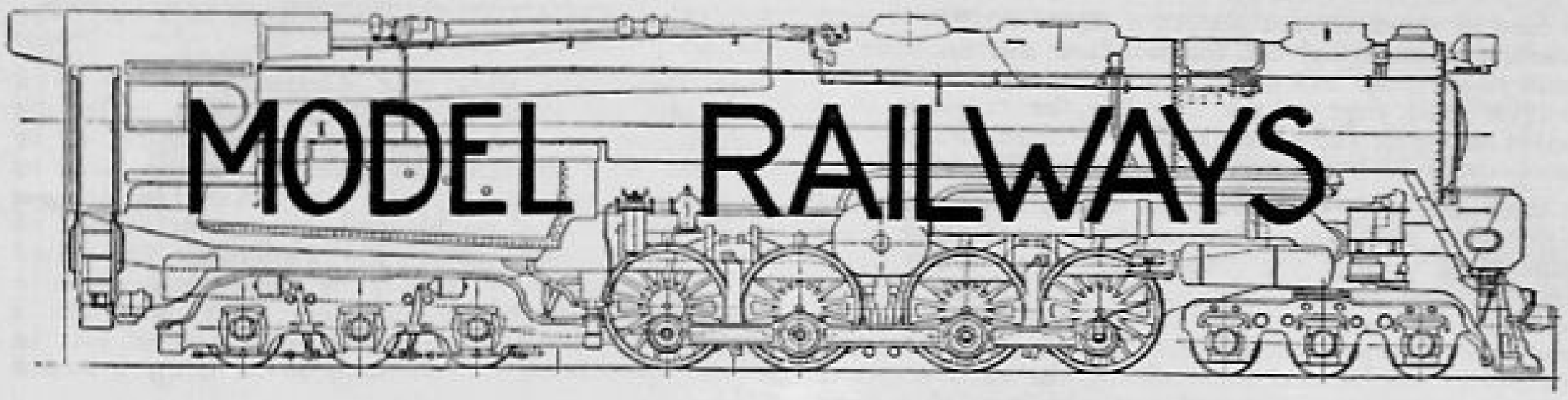
RATIO SPEED—Motor displacement in cubic inches multiplied by 100, subtracted from the speed obtained.

(Two speed contests to be run concurrently)

Interstate entries welcomed — Limited billeting available

Write to Secretary:

BOYD FELSTEAD, 71 Watson Avenue, Toorak Gardens, South Australia.



Gas Turbine Locomotive

First to use the gas turbine in a locomotive was the Swiss firm Brown-Boveri in 1941. The chief designer of the 4500 h.p. locomotive was Adolf Meyer, and it was put into service for the Swiss Railways.

This initial effort was quite successful, but as the main Swiss Railways are mostly electric, and because of war-time difficulties, little progress was made with this new type of motive power, until 1946 when the British Great Western Railway (now nationalised as Western Region) placed orders with the firm of Brown-Boveri and Metropolitan Vickers for a loco from each.

The Brown-Boveri unit consists of an axial flow compressor, a heat exchanger, a combustion chamber, and a gas turbine. The compressor is driven by the turbine and supplies air at 45 lbs. per square inch to the combustion chamber via the heat exchanger, while a far greater amount of the compressed air is by-passed to mix with the hot gases after combustion to reduce the temperature of these gases, which, in turn, heat and expand this compressed air, and so develop the high output of the gas turbine.

The reduction in temperature is essential as the present workable limit of the metals being used is about 1100 deg. F.

Gas turbine progress is being retarded by the inability of the metallurgists to provide metals for the turbine blades, which will be capable of withstanding higher temperatures in their highly stressed conditions.

Ten thousand three hundred h.p. is the estimated output of the Brown-Boveri turbine, but 7800 h.p. will be absorbed by the compressor, which leaves 2500 h.p. as the unit's actual output to be transmitted to the generator set.

The tractive effort should be 31,500 lbs. up to 21 m.p.h., with a continuous rating of 12,400 lbs. at 64 m.p.h. Working weight will be 115 tons and the range will allow a non-stop trip from London to Plymouth—about 250 miles.

The turbine featured in this issue, the Metropolitan Vickers, was originally to be a power plant evolved with the minimum of new design work, and was based on a marine propulsion unit supplied to the Admiralty, which in turn, was a development of the F2 aircraft unit.

The application of this jet unit to a locomotive involved some sacrifice of thermal efficiency, and so a heat exchanger formed part of the equipment.

However, as the project developed it became apparent that it would be possible to use a new gas turbine which was being developed as a standard power-plant for high performance locos.

The various improvements being incorporated in this new unit eliminate the heavy bulky heat adjuster, making quite a saving in size, weight and cost.

Primary source of this advantage is a recent axial-flow compressor which operates under a much higher compression ratio than the superseded makeshift plant.

The reduced weight (lbs./h.p.) allows a unit of increased power and transmission equipment of higher continuous rating, even though the light—but expensive—aluminium alloy construction of the compressor has been replaced with cast iron and steel.

Directly coupled to the compressor, the single turbine drives both that machine and the load allowing dynamic braking through the traction motor, the generator, and compressor.

TRACTION.

The power transmission from the turbine is by a single reduction gearbox which reduces 7000 r.p.m. to the 1600 r.p.m. needed to drive the three main generators, an auxiliary generator and an exciter. All five of these electrical machines are built together as one unit, and mounted with the gear box on the underbed which supports the actual turbine. The entire power unit is 27 feet long.

Each of the three main generators supplies power to two axle-mounted traction motors driving the axles through torsionally resilient single-reduction spur gears. The auxiliary supplies the power for sundry equipment including the accumulators for starting the turbine.

All the air for the turbine is filtered through dry fabric filter panels, which extend the periods between compressor blade clearing operations.

PERFORMANCE.

The turbine is rated at 3500 h.p. at 7000 r.p.m. and when allowing for losses caused by temperature variations, altitude where operating, auxiliary demands and actual transmission, the power at the rails is 2700 h.p. Maximum speed 90 m.p.h. and maximum tractive effort 60,000 pounds.

Between these limits the control equipment sets the fuel input and regulates the generator and motor field strengths to maintain the turbine output steady as selected by the operator, irrespective of variations in train speed because of changing gradients.

Estimated power/load ratios are that a 650 ton passenger train of 18 coaches will balance the power output at 80 m.p.h. on level track and at 45 m.p.h. up a gradient of 1 in a 100, and 25 m.p.h. up 1 in 50. A goods train of 1,000 tons can be hauled up a 1 in 100 grade at 25-30 m.p.h. Full load thermal efficiency of the turbine is about 25% and overall efficiency is about double that of a modern steam loco.

The fuel for the turbine is gas-oil. The driver's controls are reduced to extreme simplicity, enabling utmost concentration on signals and the road ahead.

Addressing Model Railroaders

Well fellows, we are really hard up for model railroading material for this section of the magazine. We want good photos, descriptions of models and how to build them, gen on layouts, scenery and so on, in fact, any and all items of interest to your clan.

Also, we want to know what sort of articles and models you would like us to publish. What is the ratio of live steam to electric to clockwork builders? How many buy their rolling stock complete and put their time into layouts? (Before you break up your present layout for alterations, don't forget to borrow a camera—and a fine-grained film—wait for good lighting, snap the shutter and send us a snap for publication.)

Do you want articles on lathe work, drill jigs, boring tools, grinding, lapping, honing and such machining and surfacing operations? Would plans of railway bridges, link mechanisms, materials handling plant or harbours be useful? Or perhaps there are some among you who enjoy reading more theoretical articles on how energy is stored and reclaimed from steam, how gas turbines really work, how to design link mechanisms for a given set of operating conditions (Bilgram's Diagrams, etc.)?

Summing up, we want firstly any contributions you can give us, and secondly, your ideas on what the Railroaders' Section should contain.

And don't forget we want to publish any Club News you have.

JOHN MARTIN'S HOBBY SHOW—

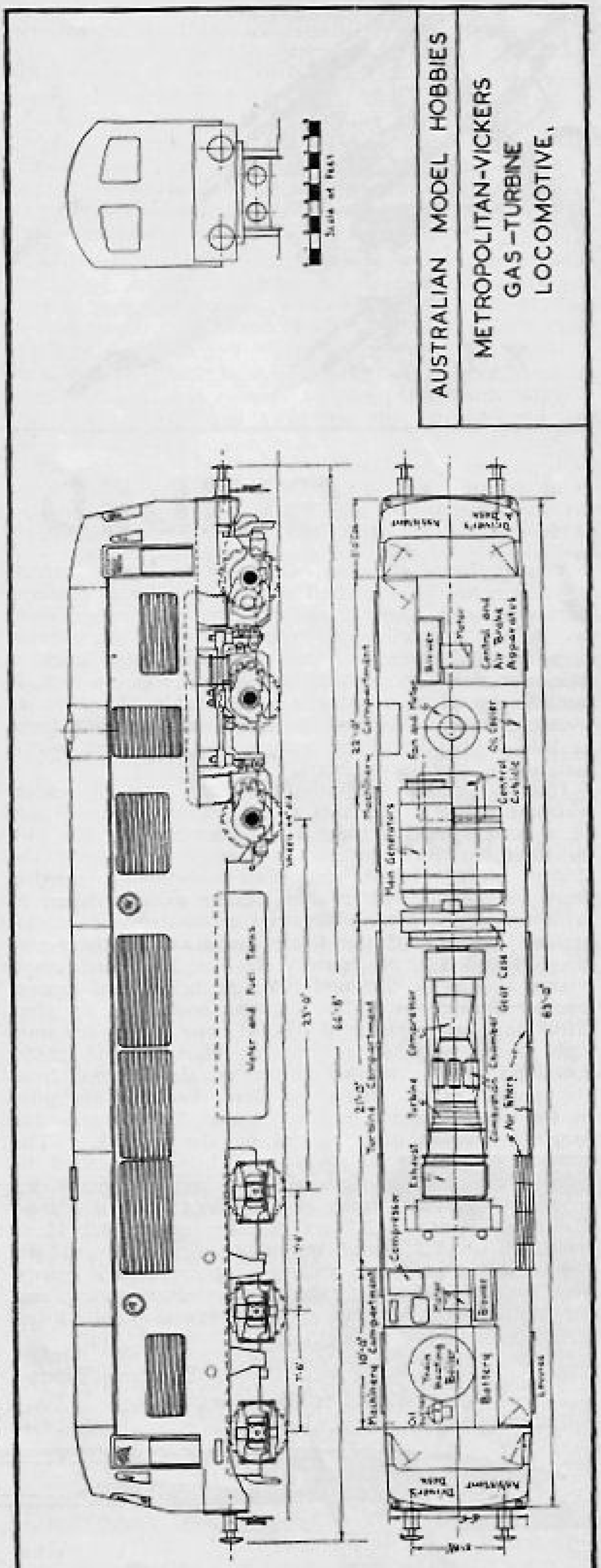
(Continued from page 7)

The race car shown on page 7 is the work of Stewart Baker, who also entered a similarly well-built speedboat, both powered with glo-plug motors of 5 and 10 c.c. capacity respectively. The car features semi-pneumatic tyres, centrifugal clutch, bevel gears, and wheel axles on ball-bearings. Mr. Buswell exhibited an excellent model of the Golden Hind, his historical care matching the dexterity of his fingers and the inventiveness of his mind—such items as cotton reels, bone, and tobacco cartons find their camouflaged way into his models.

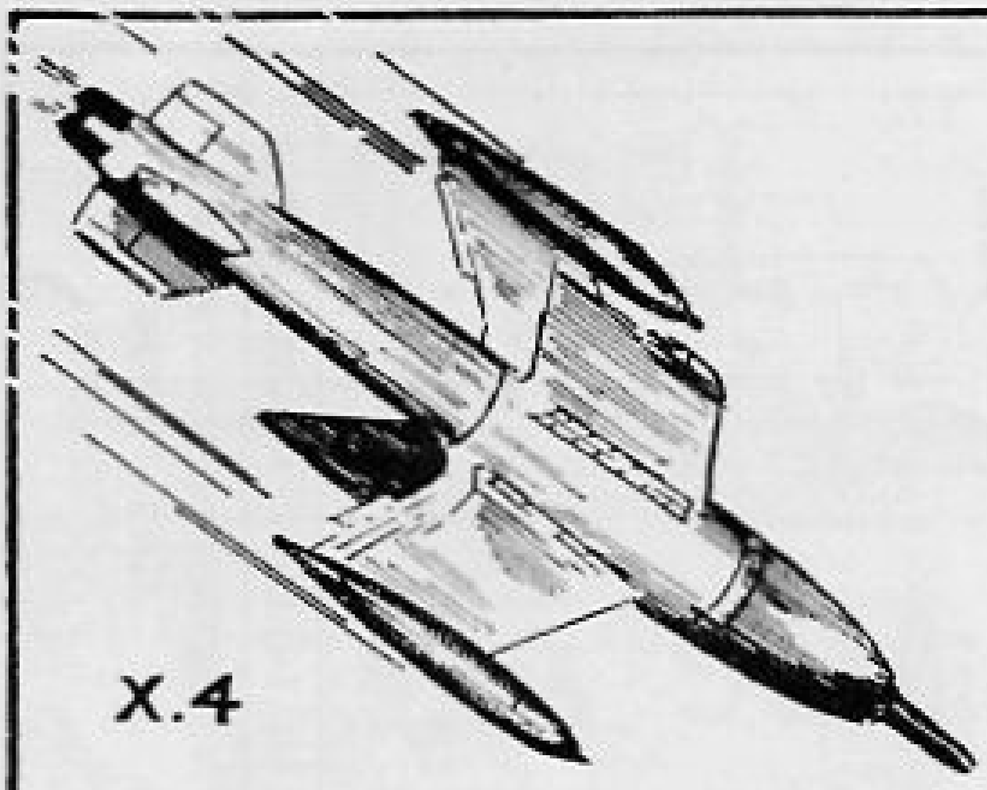
From Murray Bridge came a Metre Hydroplane, the hull by J. Excell and the ½ h.p. engine and fittings by L. N. Smyth. This business-like model claimed great attention and has, we hope, inspired some few among the visitors to try and emulate it.

Henry Moore's 1903 vintage model car is illustrated on this page; he is to be congratulated. A contrast, though not in workmanship, was seen in Ron Wood's scale of a J.A.P. dirt track outfit, reminding us of Kilburn Speedway. Murray Matthews and Malcolm Sharpe were well to the fore with several controline and freeflighters, and some good examples of model plane construction in various stages of completion.

This very brief outline does, we hope, give some indication of the high quality of the Show. Let all who for various reasons hung back from entering this year remember this Exhibition, and make those who did enter look to their laurels next.



KINDLY MENTION *AUSTRALIAN MODEL HOBBIES* WHEN REPLYING TO ADVERTISERS.



GUIDED MISSILES

Pressed from all sides, Germany inevitably turned towards remotely controlled missiles in order to conserve highly trained air-crew, and, in the long range view, to deliver explosives to the enemy at the lowest cost in production man-hours. This latter level of efficiency was not reached in the late war, in fact, it would appear to require a considerable time yet to compete with established bombing practices, but there is litle doubt that these weapons will be used by all nations in any future wars.

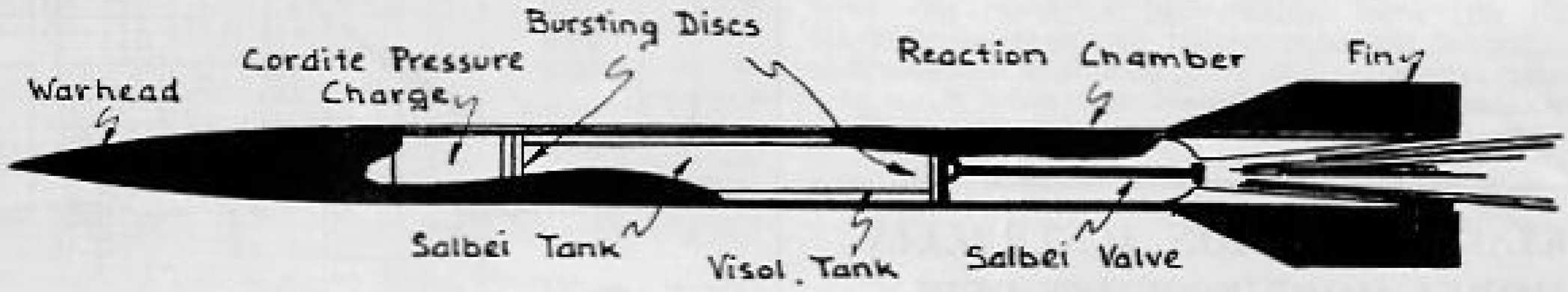
Due to pre-war enthusiasm on the part of several outstanding men, for rocket propulsion, Germany was in a better position than Allied countries for the task in hand, at least on the fuel side. In general the designs were original and often unorthodox, ranging from radio-controlled missiles similar to aeroplanes, to wire-controlled armour-piercing air-to-air and air-to-ground bombs. Of the latter for example, there was the X.4 and X.7, which could be fired from such small planes as the Me 262 and FW 190, being used against bomber formations. The X.4 was controlled by electrical impulses transmitted through two wires, each only eight thousandths of an inch in diameter and 18,000 feet long, which uncoiled as the missile departed from the parent plane. Wing tip flares enabled the pilot of the aircraft to see and guide the X.4 towards the target by means of a control on the joystick. The weapon rotated at 60 r.p.m., and being controlled by tabs in the trailing edges of the wings, it necessitated a rather ingenious timing of the tabs to give consistent directional control. It was effective up to 0.9 Mach number (i.e. 0.9 times the speed of sound or about 680 m.p.h. at lea level) and even at super-sonic speeds. The body of X.4 was a tubular aluminium casting, and the highly swept back wings of laminated wood. Proximity or acoustic fuses were commonly mounted. Being 80 inches overall, and a weight of 132 lbs., including fuel, it had 44 lbs. of high explosive bolted to the centre section.

The fuel used, in common with other guided missiles, was the amazing "Salbei," consisting of 98% nitric acid in combination with "Tonka" (43% triethylamine and 57% oxide in-xylidime). Many ingenious and rather complicated features, with which we are not generally familiar, were incorporated in the propulsion units. On the X.4 the initial thrust was 242 lbs., falling to zero in about 20 seconds.

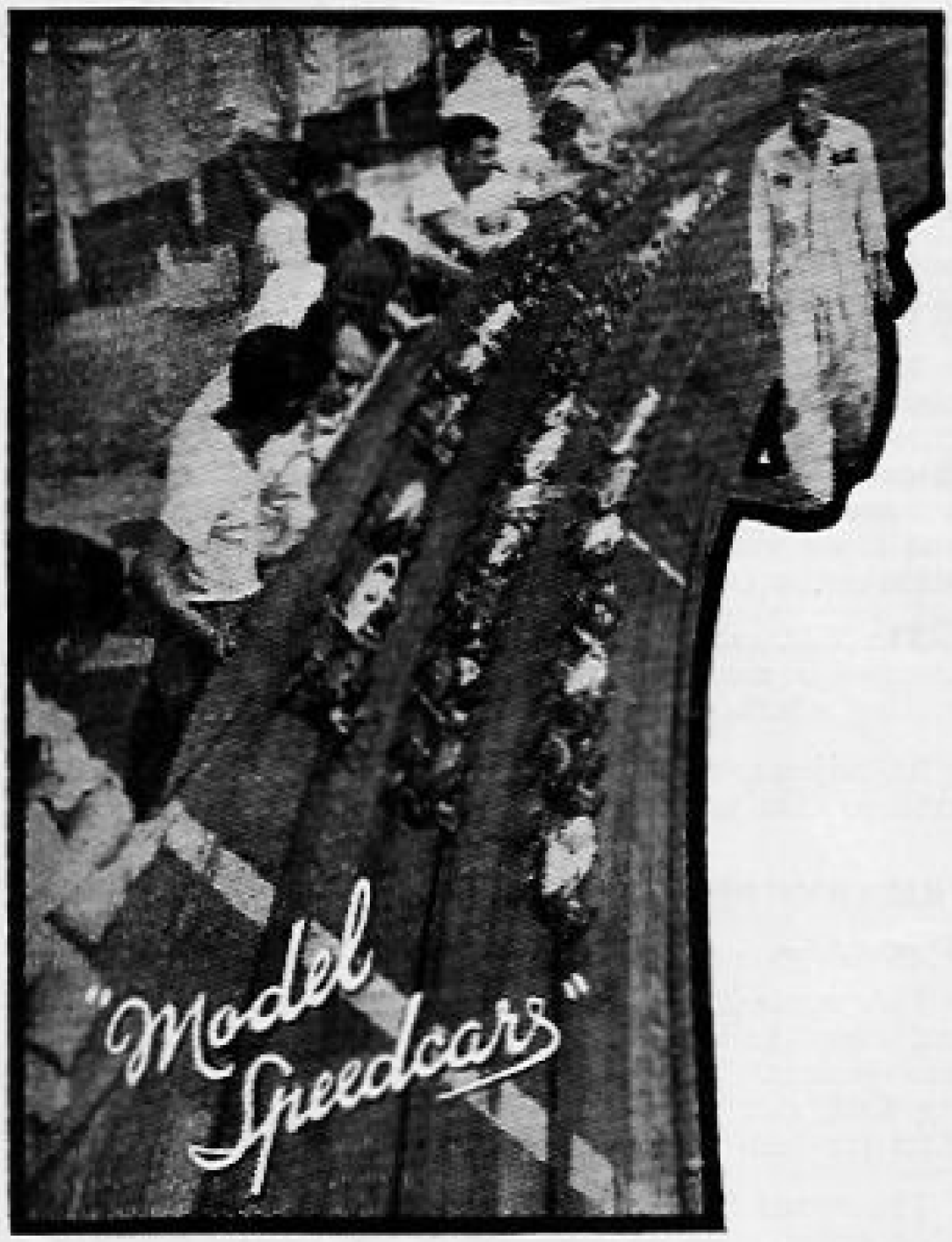
The first X.4 was tested in April, 1944, and was in quantity production by the end of the war, though never actually used operationally. Later, a powder fuel called "diglycol" was developed, giving 330 pounds thrust for eight seconds. The X.7 was in many respects merely a small version of the X.4, and was for use against armoured vehicles. It did only 220 m.p.h., and was uncompleted when war ended.

Rheinmetal-Borsig was one of the leading organisations concerned with development of guided missiles, but their efforts got only as far as the experimental and research stage. One of these, the "Hecht," was very like a small aircraft in appearance, with sharply swept-back wings of only 35 inches span, and an overall length of 78 inches. The maximum velocity of the first model was 920 feet per second, but a second machine developed from the "Hecht," having pronounced sweep-back, no dihedral, zero incidence and 550 square inches wing area, was called the "Feuerlillie." This had ailerons near the wing tips and was controlled by a gyroscope which actuated electro-magnetic servo-motors housed in streamlined fairings at

(Continued on page 22)



"TAIFUN"



E. R. A. Model Speed Car

A MINIATURE OF BRITAIN'S MOST POPULAR PRE-WAR RACING CAR

E.R.A. is a title well known to any follower of car racing, and is the line of cars which attempted to keep Britain's name among the top-line in European road racing in the 30's.

As the method of construction will vary according to the equipment available to the builder, no definite constructional details are given, but outlined are the various means of mounting a motor and the suggestions for body work.

Should a solid scale model appeal, scale up the plans on page 18 to the size desired and whittle a model from balsa wood as follows:

First trace off the side view of the body on to a medium hard block of balsa wood of a suitable size, and cut to this shape; then mark on the top view and trim to shape with a sharp knife or razor blade, resulting in a square-cross-sectioned profile shape of the car, which should be carefully carved to the correct cross-sections as can be seen in the front and rear views. With a piece of fairly fine sandpaper carefully trim to shape and when satisfied give the wood several coats of model aeroplane dope—sandpapering between each coat—to fill the wood.

If full detail is desired, the axles can be carved from a piece of straight-grained hardwood, and the springs formed from hard shim brass, with the shock absorbers, etc., made up from wood and wire, but if these details can be overlooked, a piece of steel wire will make a far more substantial job.

A wheel of about 1¼ in. diameter is available in most toy shops, made by Rubbertex. It is an attractive job, but is more in keeping with a dirt track wheel than a road racer, but a little careful trimming with a razor blade will enable you to remove some of the tread.

Model aeroplane lacquer which can be purchased in small quantities, is suitable for the paint work. Usually the E.R.A. is finished all green with a black number in a white circle.

Construction of a powered model is, of course, a little more complicated, but as the more simple forms of transmission are within the capabilities of the "kitchen table builder," very little trouble should be experienced providing a practical line is followed.

If your tools are limited a 5-ply aircraft-plywood chassis is suggested and the body formed from balsa wood with an aluminium bonnet.

Scale up the drawing, using the scale given, which will give a car of a size suitable for small diesel engines of 1 to 2 c.c. capacity. This can easily be enlarged should a larger motor be the intended power plant.

Decide upon the type of transmission to be used—see pages 16 and 17—and arrange the positioning of the motor accordingly, and then the plywood chassis can be cut to suit the motor.

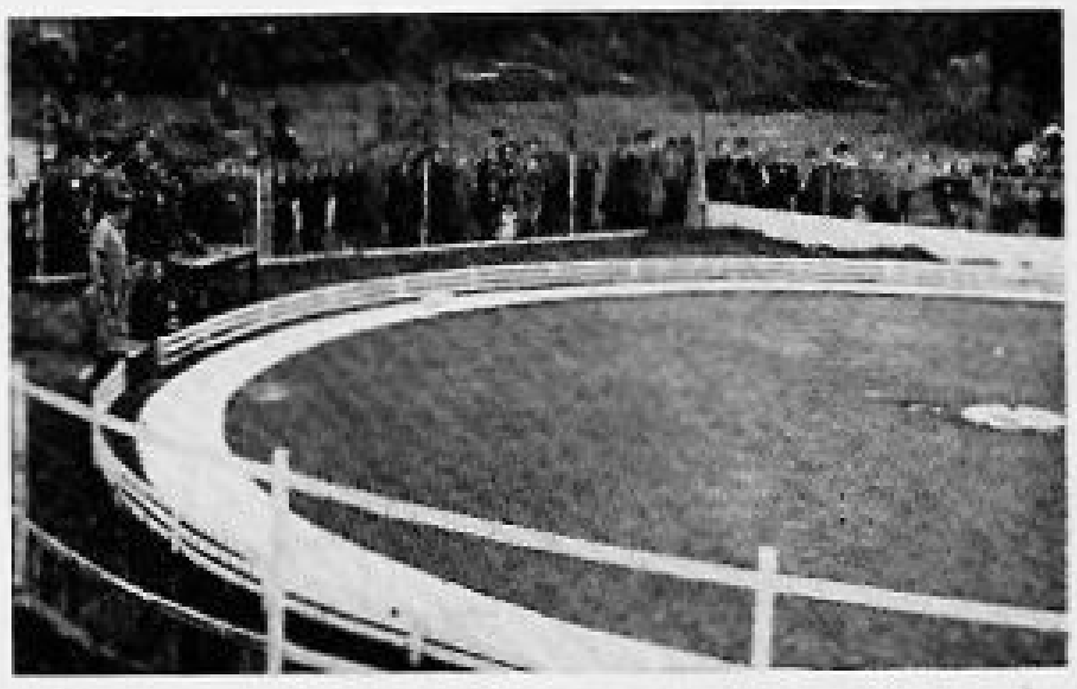
The method of fixing the axles will depend upon the type of transmission used.

Prepare the body work in the same manner as suggested above for the solid scale balsa wood model.

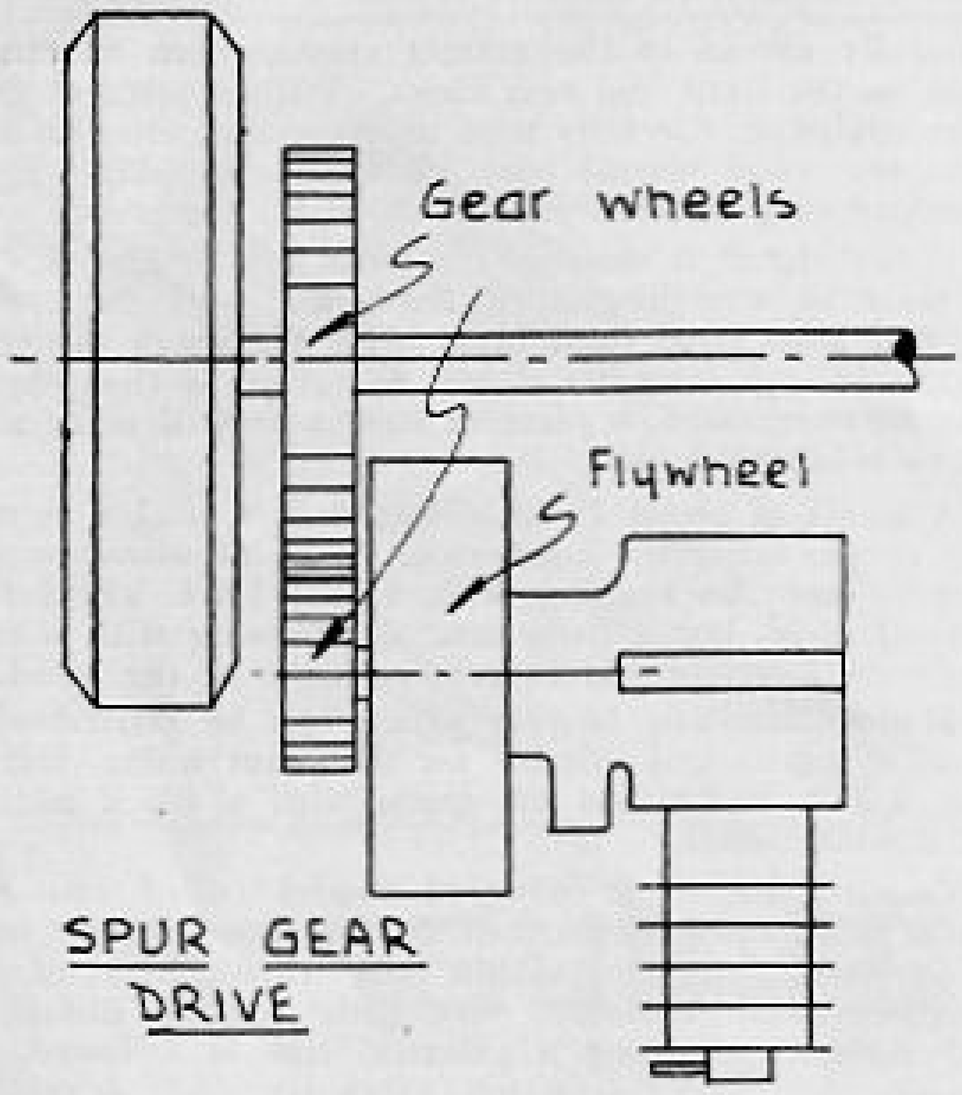
Wheels may present a problem, but Meccano, "Model it," or one of the many types of model aeroplane wheels should do the job.

If the car is to be really engineered and an advanced model made, the builder should be able to decide upon the method of construction himself and a lengthy description is not warranted.

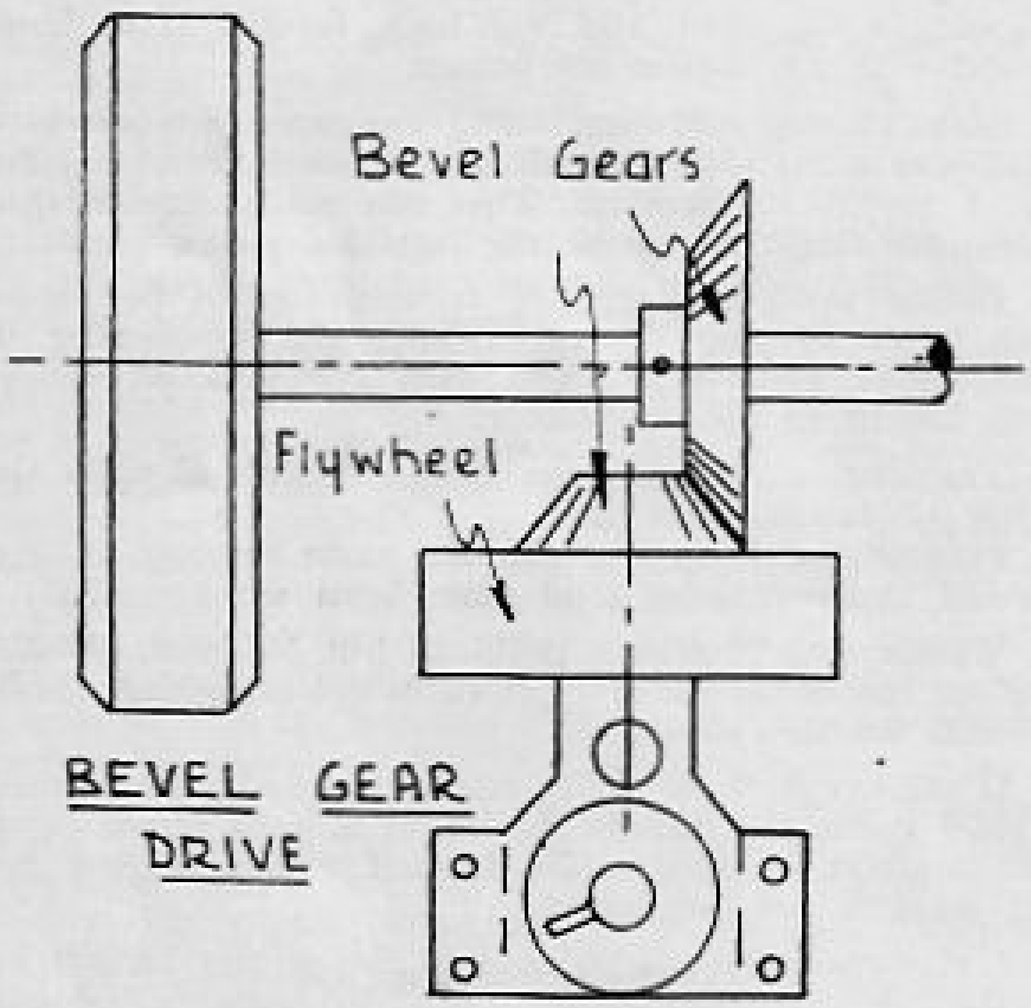
(Continued on page 19)



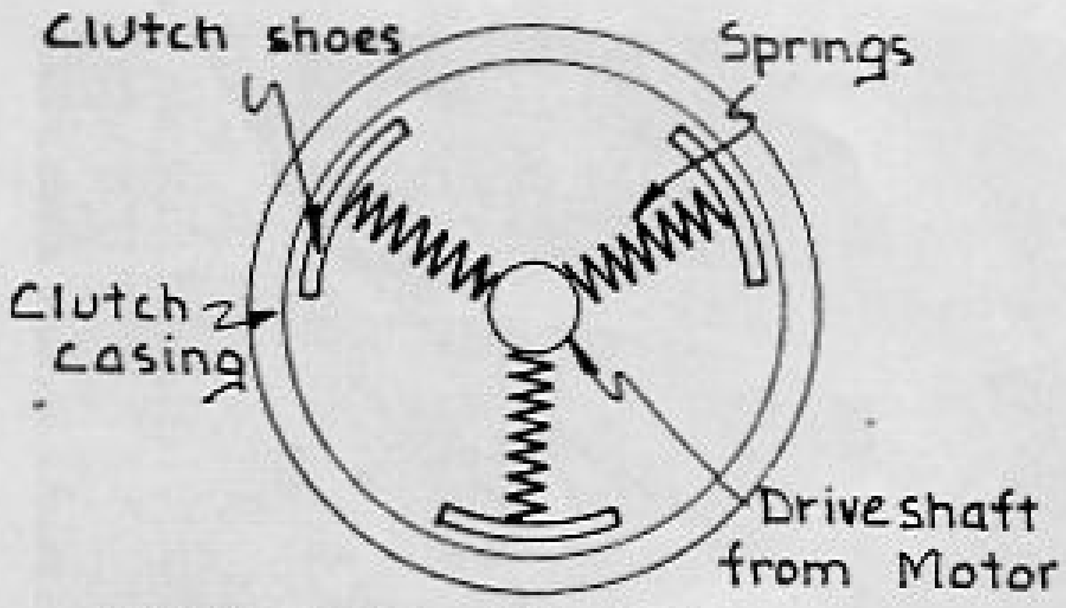
The track of the Riverside Miniature Car Club, showing the Larson Meteor at speed—just a blur! This is one of the best tracks in Australia.



SPUR GEAR DRIVE



BEVEL GEAR DRIVE



PRINCIPLE OF THE CENTRIFUGAL CLUTCH

Model Race C

Here are described several types, some needing elaborate equipment for their construction, whilst others can be made with few tools.

SPUR GEARING. (Refer Figures 1, 2 and 5.)

This type of direct drive is that used by most really high-speed model cars of the streamline class. Almost universally used in the U.S.A., this type of gearing is less favoured in Great Britain where the trend is to build a more realistic scale model operating at slower speeds and fitted with the centrifugal clutch, crown wheel and pinion set-up.

The E.D. car kit reviewed in the last issue of A.M.H. featured a combination of centrifugal clutch and spur gearing which performed well.

An adjustable motor mount is necessary—or adjustable axle—so that gears may be kept in correct mesh.

FRICTION DRIVE. (See Figures 4 and 6).

Type "A"—

This method was used to some extent many years' ago and offers the builder with limited resources a satisfactory arrangement. The general construction is that of a rotating back axle to which is fitted a hard fibre disc of a diameter such as to give the required gear ratio.

The actual friction pinion must necessarily be of somewhat softer material, and one of the many fibre-rubber compositions will do the job.

The friction pinion may be fitted direct onto the crankshaft providing there is sufficient length for the friction disc to clear the flywheel.

Although we do not strongly recommend this system, it may interest some of the potential model race car builders.

Figure three shows a centrifugal clutch. The shoes are spring loaded so that when not rotating there is an appreciable clearance between them and the outer drive ring. On commencement of rotation of the crankshaft, the shoes are thrown outward by centrifugal force which overcomes the springs' tension and allows the shoes to grip the outer ring. Though not shown on the diagram, the shoes are held rigidly to the crankshaft as far as rotary movement is concerned, and hence the tailshaft is driven.

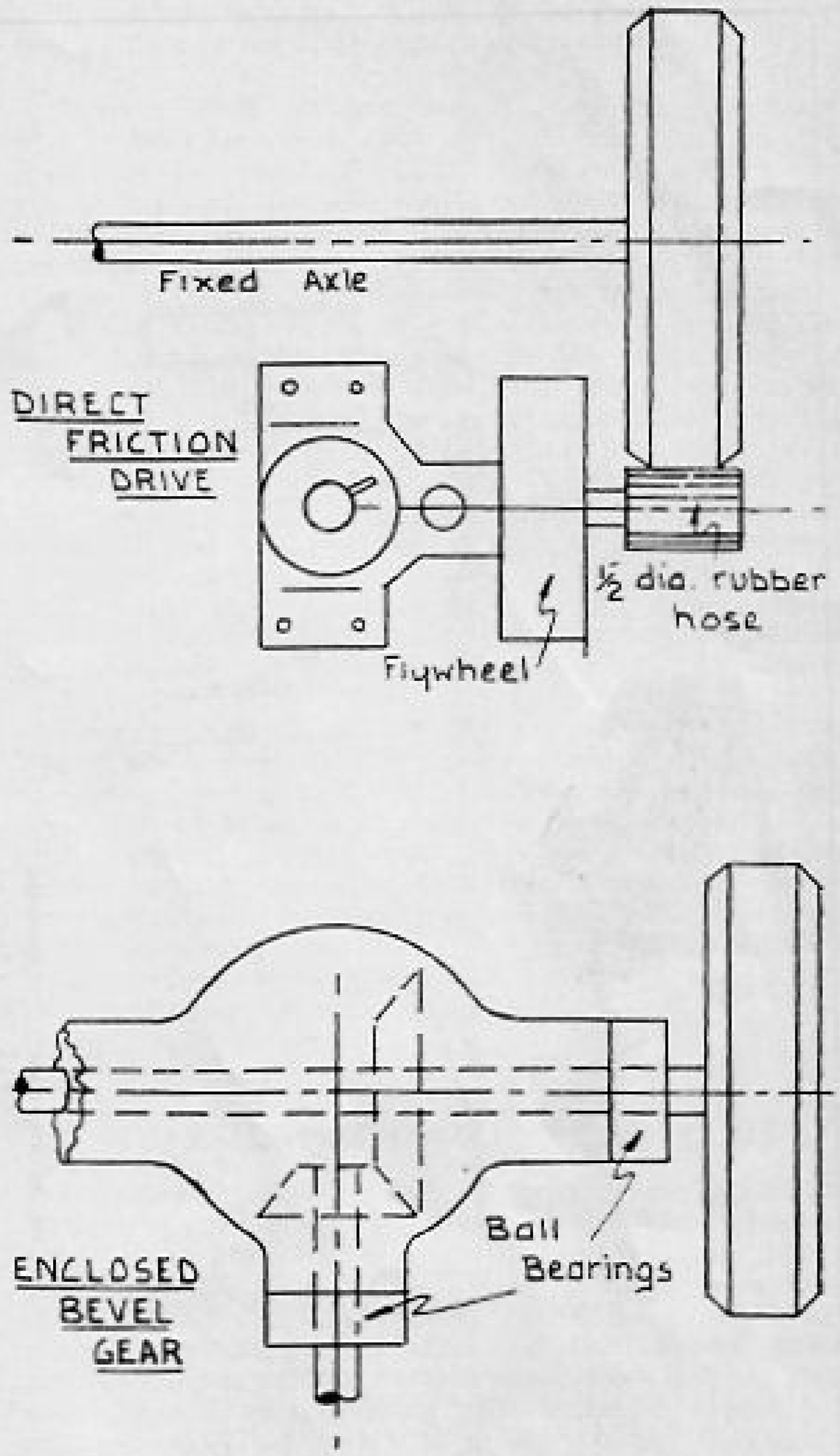
Type B friction drive is that in which a driven roller rests directly against a car tyre and so causes the latter to rotate. This is obviously a very simple mechanism, but has several major drawbacks. One reasonable application is on scale models of real cars, especially sports and touring cars. In such cases the roller is mounted low down beneath the car in order to keep it from view.

It must be obvious here that we have not considered in detail the differential gear drive. Many builders feel that the constructional difficulties and the increased weight and loss by friction make this drive more or less useless. It has, however, been found possible to produce an efficient, light differential in the home workshop, with care, and we will be only too glad to help any reader with his troubles should he make the attempt.

Car Transmissions

One way to avoid all transmission troubles is to use the direct drive, in which the crankshaft itself is the axle of the single driving wheel. This has been accomplished with most success on the small CO2 motors, and on small diesel engines. It is particularly suitable for beginners to the model car racing hobby due to great simplicity. Speeds up to 50 m.p.h. have been obtained on first models. It is worth noting that with this form of drive we have all three free wheels running at the speeds they wish, or in other words, we have the effect of a differential. No clutch, no gear wheels, and fewer bearings greatly reduce the fitting and turning work on such a car. Starting is by either mounting a grooved wheel on the driving axle and using a cord, or by running the model along the ground. Obviously it is possible to build special motors with an axle or crankshaft going right through the crankcase, and thus have two driving wheels on the model. With this set-up the high speed powerful spark ignition engines can be fully utilised.

Other drives which avoid gears and clutches are of course the jet engine and the rocket. The former is being used by a few, but is likely to remain small in numbers as long as the units are difficult to run and maintain. Rockets, on the other hand, are looked on askant by rank and file modellers, even in these days of V2's and other rocket weapons. We venture to predict a growing interest in reactance propulsion units during the next few years, and with it a general raising of existing speed records.



CLUB NEWS

Australian Model Race Car Clubs

Monthly notes from all clubs will be appreciated.

Riverside Miniature Car Club,

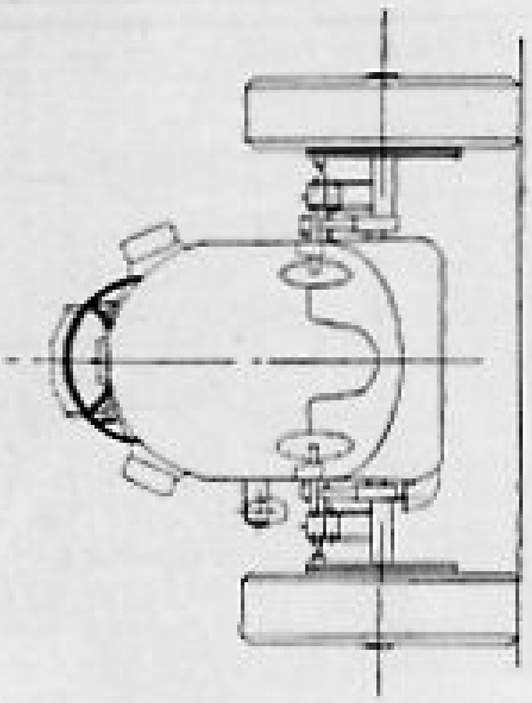
c/o. J. FLYNN,
19 Lord Street, Carnegie,
S9, VICTORIA.

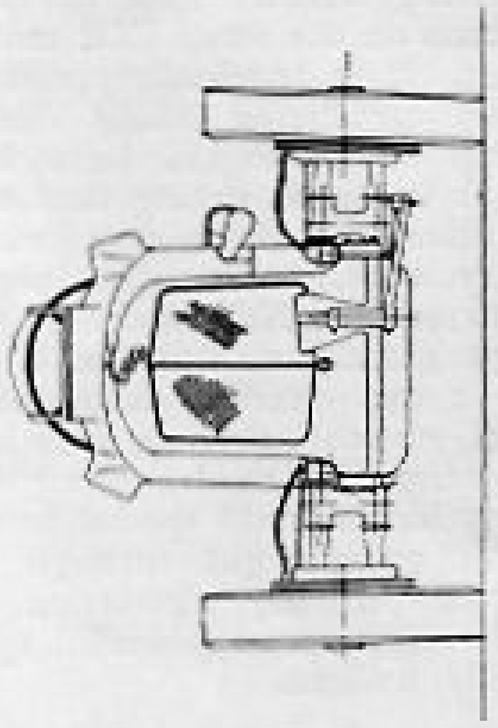
Victorian Model Race Car Club,

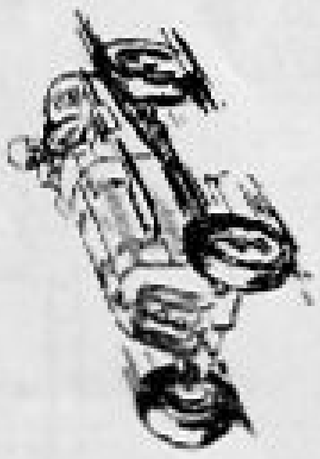
c/o. B. M. COZENS,
16 Darling Street, South Yarra,
SE1, VICTORIA.

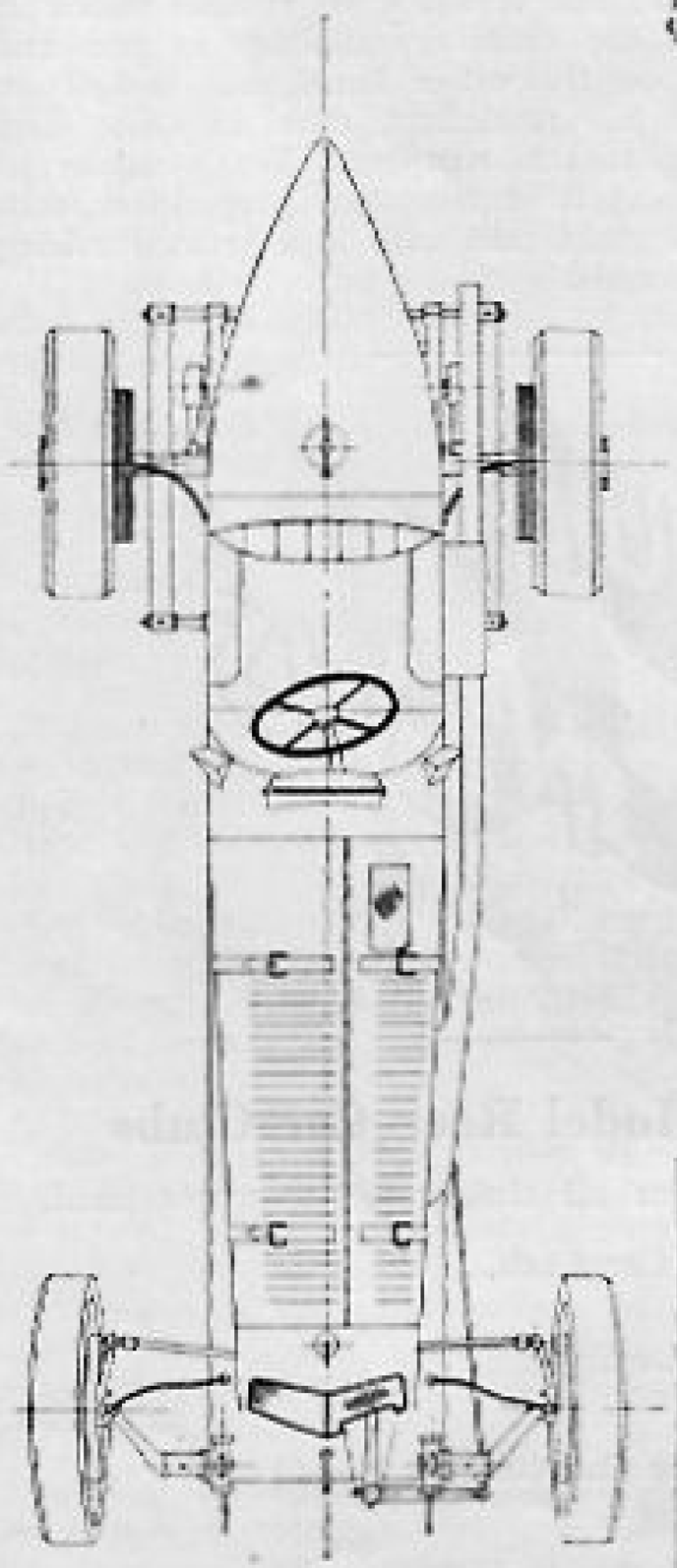
Miniature Race Car Association of Australia,

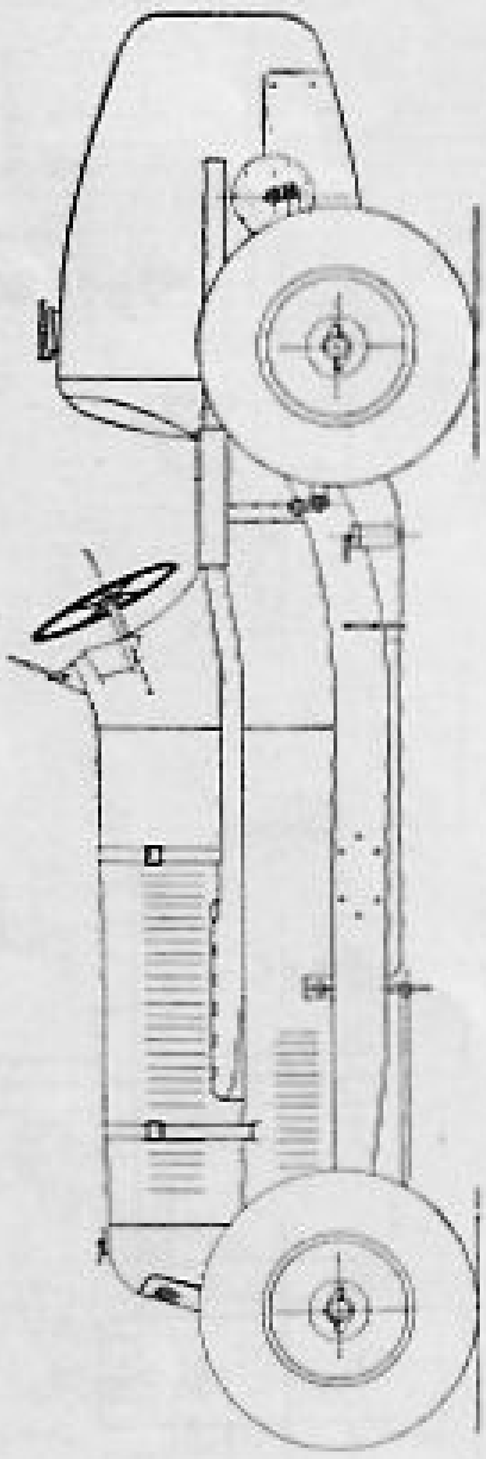
c/o. H. W. FERGUSON,
26 Deacon Street, Auburn,
NEW SOUTH WALES.











AUSTRALIAN MODEL HOBBIES

E.R.A – R4D
ONE OF GT BRITAIN'S
MOST FAMOUS SPRINT CARS

E.R.H. Model *(cont.)*

RUBBER POWERED VERSION

For those who have not or cannot afford a model engine suitable for a model race car, and are not satisfied with a lifeless solid model, rubber strip may provide the power for the car.

Build up the model as described for the solid model, but hollow out the body as much as possible.

Use a strip of Meccano axle for the back axle and mount on this a bevel gear—a pair may be bought from a Meccano dealer quite cheaply. Obtain some brass tubing which fits over the axle to act as bearings. Having hollowed the rear of the body so the gears can be fitted, drill the body to take the brass tubing, and cement two short pieces into the body either side of the bevel gear fitted to the axle. (Model aeroplane cement is best.)

Now an assembly must be made to hold the other bevel gear in mesh with the one on the axle. This is best formed from a Meccano strip, which is bent into a long "U" shape to fit inside the hollowed body, running from the front to the rear where the gear must fit—the front axle may be run through the holes in this strip—and be so arranged that one of the holes in the strip will act as the bearing for the pinion of the bevel gear.

Either a hook for the rubber may be soldered to this short pinion, or with a little heavy bending a hook may be bent in the pinion itself. Fit another hook in the front of the car and hook four strands of aeroplane rubber between them. Wind up by running the car backwards and then try your speed wagon.

Overseas some amazing speeds have been obtained with rubber powered race cars of this type, in the region of 100 m.p.h. in fact. These very high speeds are so far only possible over very short distances due to the difficulty in storing large amounts of energy in small quantities of rubber. However, may we hope that this be taken as a challenge to our ingenuity rather than the natural limit of rubber-powered models? In other words; let us make the attempt to increase the range and still maintain the speed. As a pointer, we suggest that the answer may lie in larger models having several separate rubber motors in series, taking over as the previous motor is spent. Viewed basically we see that the surface area of the car, which constitutes some 50 per cent. of the weight of the car—minus motor (s)—increases as the square of the linear dimensions, while the volume increases as the cube. Hence we have more room per unit weight in a larger model in which to put the rubber strands.

There is a limit to how light a car can be if its wheels are not to slip for a given driving wheel torque, and our object is to construct a very light chassis and body, and bring it up to the necessary minimum weight with rubber. It may well pay to continue adding rubber beyond this point, but do not lose sight of the fact, particularly with the chassis and body covering, that the heavier the model the more energy is used in accelerating it to speed, and hence the less is left for duration or distance at speed.

C. W. Ballem who, with Pete Larson, has been responsible for much of the success of the Victorian Model Car Racing, holds his Dooling powered, spur geared, McCoy Car, which is Australia's fastest at 107.4 m.p.h. Also a prototype Australian Record holder, Arrow Car, Dooling Motor. Speed 94.5 m.p.h.

RIVERSIDE MINIATURE CAR CLUB

Activities at the Riverside track have been somewhat hampered of late by the wet weather and transport restrictions. However, some good practice runs, during the fine spells, have been made by the lads from both our own and the V.M.R.C. Clubs. Working parties are putting the grounds in order for the coming season and also replacing the wooden crash fence with a steel one. This latter operation will make it possible to run the really hot cars without any risk to the spectators. (Some of these machines have been "on ice" for nearly a year.)

Now that the Club has passed through its first year of existence, we find that the business of the monthly meetings can be dealt with fairly quickly. Consequently, we have embarked on a series of lectures, film screenings and discussions which make these evenings most interesting and enjoyable affairs. The lectures have a special appeal, as they are given by some of our leading "mini-car" operators.

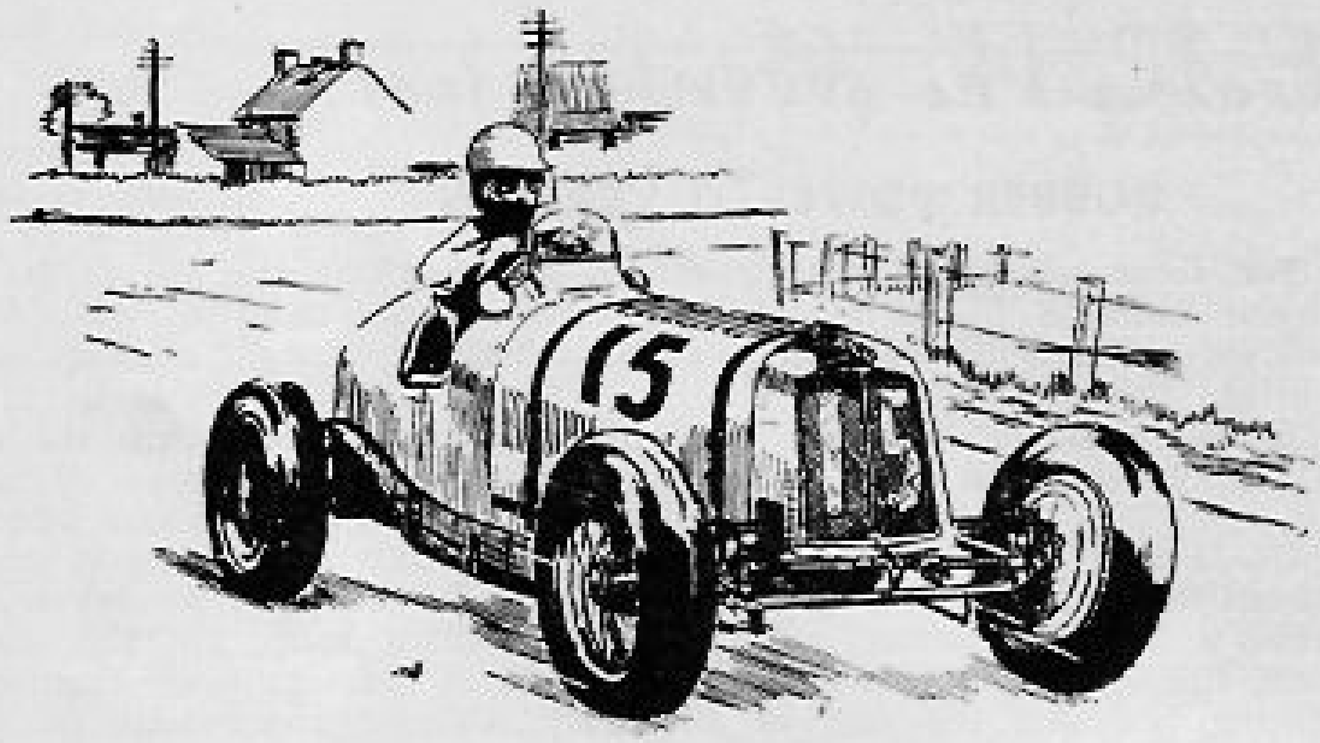
Perhaps the Editor will print them for the benefit of interestate enthusiasts? (Certainly.—Ed.)

We hope to have quite a number of 2.5 c.c. and under types on the cable before very long. These little fellows are becoming very popular and should be a big thing in localities where a concrete track is not available. Our own expert is Wes Vickers, whose 1.3 c.c. Mills Bomb has amazed all who see its beautiful construction and rock steady 36 m.p.h. runs on a special lightweight cable.

The monthly meetings are held on the last Friday of the month at 8 p.m. sharp. The meeting place is Third Floor, Roma House, 240 Elizabeth Street, and all enthusiasts are welcome to come along at any time.

E. R. A. RACE CAR

TYPE "R4D"



With the advent of the E.R.A. (English Racing Automobiles Ltd.) series of racing cars Great Britain became a force to be reckoned with in the road racing world, and with drivers of the calibre of Raymond Mays, Arthur Dobson and Pat Fairfield behind the wheel the score soon began to mount. Without detracting from the great records of these British drivers, it should be said that probably the greatest driver of the E.R.A. was "B. Bira" (Prince Birabongse of Thailand). This remarkable driver, and great sportsman, was always well to the fore in one or other of his blue and yellow E.R.A.'s—the famous "Romulus" and "Remus."

In their first six years of racing E.R.A.'s gained 24 first places in International Light Car Races, and of these Bira won seven, a feat which very few drivers have ever equalled.

For three consecutive years he was the winner of the Road Racing Gold Star, with record points. In 1936 he scored 73, in 1937 again 73, and in 1938 he increased the record to 86 points.

In the sprint racing field Raymond Mays, with his black 2-litre E.R.A., proved equally successful and his car has gained the reputation of being the fastest car in Great Britain.

This is the car we have selected for this month's plan, and it differs from the earlier E.R.A.'s in that it has a divided track rod, steering being effected by means of a bell crank pivoted on the front of the chassis with a drag link running rearwards to the steering box.

Quiz Photo.—Who are these two famous Australian Race Car Drivers shown in a pre-war road race?

The bell crank is on the near side of the R4D, with the steering column set at an angle to this side. This can be clearly seen on the plan.

On the earlier type C. the bell crank was on the off side.

This car was originally driven as No. 1 "works car" by Arthur Dobson. Raymond Mays purchased it from the firm, and had it altered to suit his personal requirements, with most gratifying results.

HIGH-LIGHTS OF NEXT ISSUE

Dethermalisers
Class A and B Speed Controliners
A Simple Wakefield
Built-up Rolling Stock
Cal Niday Type Speed Car
High Speed Hydroplane
Elementary Sailplane
Valkyrie Review
Plus Our Regular Features:
Club News
International Round-Up
Theory

HEARD IN THE SHOP

Dealer: I'll have you know, sir, we are selling these engines by the dozen.

Customer: I don't doubt it. How much a dozen?

—E.S.M.A.C. News.

DISCRETION

Speed Champ: Say, kid, have you any desire to fly a Controliner?

Kid: Why, no.

Champ: Good, how about watching my Super Streak while I go and have a malted milk?

—E.S.M.A.C. News.

Aeromodellers in the News

QUEENSLAND

Brisbane:

We fly every fortnight—all sections.

Recent records set are: Ian Butler (jnr.) sail-plane under 150 square inches, three minutes, five seconds, who also made an unofficial flight of one hour, ten minutes, O.O.S.

J. Milcahy (snr.) eleven minutes, 45 seconds.

I. Unwin (snr.) tailless, two minutes, 30 seconds.

At least six models have recently been lost in the bush. In the summer thermals abound, and we have to be careful with motor run.

At present our activities are centred on our Annual Championships.

Townsville:

Mackay, Rockhampton, Ipswich, Maryborough, Mangango and Cloncurry have formed clubs or intend doing so shortly.

Toowoomba:

News from here is little this month as most local modellers have been busy preparing "hot" models for the Queensland annuals.

WEST AUSTRALIA

Thermal Thumbers Club:

Seven new members have been welcomed since last month. A control-line meeting was held at our field, Riverside Drive, recently, and some very impressive flying was witnessed. Our local radio-control expert, Rod. Ashton, is becoming as equally proficient at control-line flying. Rod. is flying a Cyclone powered model.

Many of the younger lads are making fine progress. Bill Wormley provided a spectacular crash when a shattered propeller caused his model to disintegrate in mid-air.

We recently received quite a boost when a local picture magazine gave our activities a double-page spread.

NEW SOUTH WALES

During the last few months much progress has been made by the M.A.A. of New South Wales. District clubs are at last getting underway and we should enjoy some keen competition in the near future.

This is particularly apparent in the "U" control stunt, with many chaps regularly producing figure eights, inverted flights, and consecutive loops. We are hopeful of making a good impression at the 1950 Nationals in Victoria.

Foremost amongst the stunt men at the moment are Clive Wheatley, E. Adams, Wally Judd and Arthur Wyld, with some junior members showing excellent form.

Most of the free flight boys are concentrating on Wakefield models and this should promise to be the most keenly contested event next year.

We would particularly like to hear from the Victorian Committee the details of the 1950 Nationals, as our New South Wales Championships in December will be in the form of eliminations, and it is apparent that events in both meets must coincide in rulings.

North Shore Model Flying Club:

This club was formed several months ago by local M.A.A. members who had been meeting at local flying fields and at monthly flying days at Centennial Park. A properly constituted set of rules has been drawn up, designed to promote model flying, and the newcomer and younger members are well catered for.

Practically all phases of model flying are covered by the members although control-line, at the moment, has the edge on other forms. Unfortunately, at the moment, all members are seniors and we are very keen to have young modellers join up. Information from:—

Mr. Clive Wheatley, 2 Mosman Street, Mosman, N.S.W. Phone XM 4606; or

Mr. John Martin Jones, 550 Miller Street, Cammeray, N.S.W.

East Sydney Gremlins:

This club was re-formed about a month ago with Col. Mudge as "Captain." Although comprising only ten active members, this club managed to produce a good showing at Centennial Park on 10th July.

Adams turned on some excellent flying with "Super Snack" (Super cyclone powered) and "Beetle" (Whirlwind powered) many times going horribly close to terra firma, finally taking a "Super Snack" and coming off second best.

Col. Mudge flew his Mark III E.D. from a dolly with great success. Also E.D. powered was the "Mercury Magnette," of Bill Syrl and son, which flew well until a bad landing caused engine mount trouble. Full credit to young Barry Anderson, a twelve-years-old lad with a Mills stunter, who shows promise of going a long way in "U" control. Of course, Bill "Jerk" Hampson was there with plenty of fuel, plenty of props and a plane but no flights. The trouble was a broken gudgeon pin trying to get out through the cylinder.

Address "Gremlin" correspondence to:—

W. Hampson, Flat 23, No. 10 Clapton Place, Darlinghurst, N.S.W.

Western Suburbs M.F.C.:

W.S.M.F.C. is fortunate in having a very active membership who build models in all phases of model flying. Senior members include Les Annesley, Bob Rowe, Art Meader (Australian Champion, 1948) and Eric Brown, all of whom were prominent model builders before the war.

Of the junior members, Wal. Buckley and Noel Magnus (rubber) and Graham Brown (control-line) have all won contests and with the other junior members in the club, will go a long way in competition flying.

Art. Meader is taking time off free flight to do some steady (?) stunting with his E.D. powered "Kandoo."

Les. Annesley is working on teams speed which is catching on generally in N.S.W.

Col. Pitland, Bob Rowe and Eric Brown are working on speed models for all classes with some success. The free flight side of the club is mostly concentrating on Wakefield models with a view to adopting a standard design.

Recently the club flew a contest with Birmingham Club in England and results will be published when they come to hand.

Secretary: K. GREY, Vaughan Street, LIDCOMBE.
President: BOB ROWE, 31 Maud Street, LIDCOMBE.

Lismore:

Adrian Bryant is building a speed job for his new G.B. to fly in the Queensland Championships.

Recently he has been flying, very successfully, a Mills powered model very similar to Morris Schoebrum's "Rocketeer" which he recently lost.

VICTORIA

Eastern Suburbs Model Aeroplane Club:

A new Mac. 49 recently arrived for Dick Asdwith, and he is really set for the speed hardware. Norm Bell is making a class "B" Little Rocket for his "ETA" 29, a motor about which he is very enthusiastic.

Correct glo-fuel is hard to come by here, and most of the boys with the big port motors have been adding nitro benzene benzol, to alcohol, in attempts to get flexible, faster running.

Another new racing motor has made its appearance here. It is very similar to the "Dooling" and runs very smoothly and looks as if it may have that extra something.

Monty (Anderson Spitfire) Tyrell is resting lately, awaiting the arrival of an "O. & R. 29," for which it is rumoured he intends building a free flighter.

Keith Hearn has a new Baby Anderson Spitfire, and Les Heap a "K and B" Infant. While very small and interesting, they seem to be remarkably useless. Jack Hadaway has built a new "Squirt" for his Dynajet.

Ron Gladstone operated on a "Juggernaut" jet unit and produced good results.

It would seem that all owners of "Juggernauts" should dump them in a bucket of water and locate all air leaks by blowing through the tail. While air leaks exist in jet units, they will not run.

SOUTH AUSTRALIA

South Australian Aeromodellers are now busy preparing for the forthcoming Championships to be held in October in this State.

New designs are appearing weekly and most of the boys are confident that they can make things pretty hot for any Interstate competition. Much disappointment has been expressed both on the field and in the clubs at the delay in announcement of the rules for the 1950 Nationals, since it is intended to fly to the same rules in our October show.

The free flight contest held at West Beach on 31st July, was won by Rex Meyers with an average ratio of 10 to 1.

Wally Reeve and Hartley Young gained the minor placings with average ratios of 8 to 1 and 7 to 1 respectively. Wally Reeve's new "Bantam" powered job made an exceptional flight towards the end of the day. Made on a cold day which definitely lacked thermals, his flight ratio of 19½ to 1 gives some indication of how this model will perform on a warmer day. Unfortunately, he did not R.O.G. his model and the flight was declared unofficial.

Glenelg Flying Club:

Club President, Bill Evans, has gone to Brisbane to compete in the Queensland Championships. Travelling with him is Kev. Green. Both are travelling on Kevin's motor bike.

Neil Evans is slowly progressing with his outsize in free flighters, wing-span being nearly nine feet, and power is McCoy 49.

Ian Giles is the proud owner of a new E.D. Bee. This young modeller is one of the most promising juniors in the club.

Mal. Sharpe has got his "Jetex" powered flying wing performing successfully and expects to go well in future "Jetex" contests.

Woodville Club:

Under the guiding hand of Association President, Jack Black, this club is fast making its presence felt. At a recent inter-club control-line contest Woodville walked away easy winners. Jack Black did "the book'" with his ancient stunter fitted with a new wing and powered by one of his own 10 c.c. glo-plug motors.

Glen Coates also did some fine stunting with his diesel powered model and Murray Matthews won the precision event with an "Old Faithful" also powered by one of Jack's motors.

Western Districts Club:

We are as yet still in the infant stages, but under the leadership of Alf. McKay and George James, this newly-formed club will soon be in a position to compete against the older clubs.

Those interested in joining this club are asked to contact:

Mr. A. McKAY, 29 Phillips Street, SOUTHWARK, South Australia.

GUIDED MISSILES—Continued from page 14.

the tips of the wings. The 1,100 pounds thrust lasted six seconds ,and the weapon was launched from a ramp at an angle of inclination of between 60 deg. and 70 deg. Later still a tailless version, known as the F-55, was built, with an overall length of 189 inches, a maximum velocity of 1,375 feet per second, and it reached a height of 16,000 feet. This appears to have been ready for mass production as an anti-aircraft (bomber) barrage.

Also intended for A.A.-barrage work, but quite different in external design, was the "Taifun." This, 76 inches long, four inch diameter projectile was really comparable with the British Z-gun projectile, but it used liquid fuel rockets in place of cordite. A range of 7½ miles was possible, or a maximum altitude of 50,000 feet, the maximum velocity being almost 4,000 feet per second (2,700 m.p.h.). The total weight of 110 lbs. was made up of 45 lbs. structure, 23 lbs. of fuel and 42 lbs. of warhead explosive.

Next issue we describe two really outstanding efforts, one of which has the elements of a most effective A.A. weapon. Notice that in describing rocket or other reaction-type motive power, the three most important factors governing maximum velocity, and hence range and altitude, are the thrust, duration of thrust, and weight of projectile. The science of ballistics of these and more recent weapons is one of the most advanced; the solution of differential and other equations requiring the very wonderful electronic machines being developed in England and America. (These machines occupy large rooms, and can quickly solve mathematical problems which would require many years of continuous work by first-rate mathematicians.) Hence no attempt is made here to analyse their flight paths beyond the general observation stated above. Should any reader be interested in the problems of ballistics, he will find "Ballistics of the Future" a useful reference book.

(To be continued)

THE ALBATROSS—Continued from page 2.

line and white below this. In painting on the water line lie a strip of scotch tape from bow to stern for each colour operation.

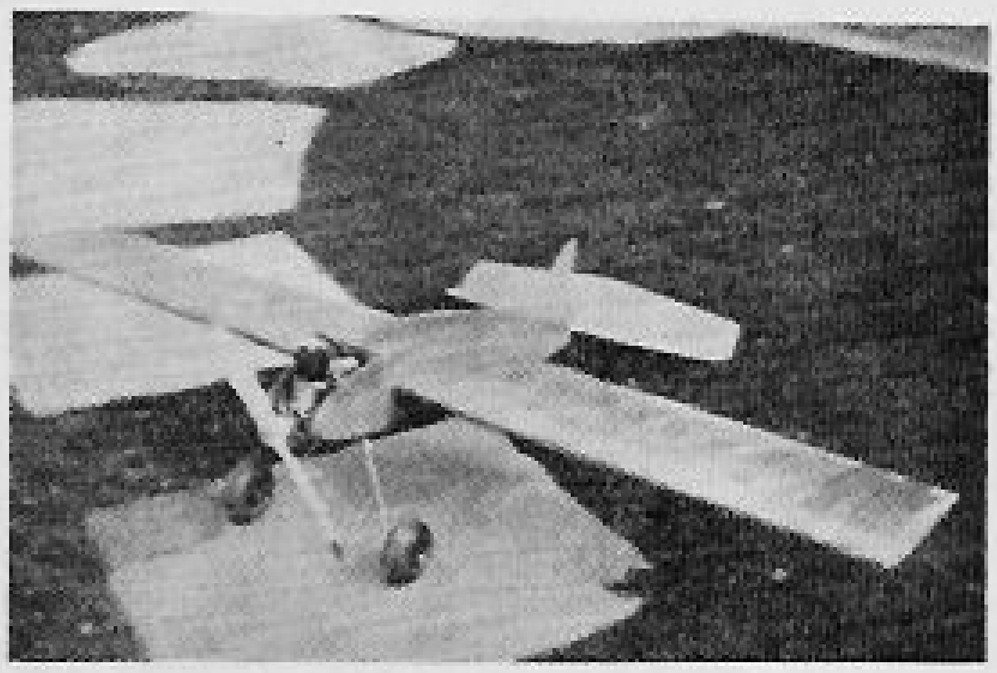
The sails are best made from very light linen, such as unwaxed tracing linen. Turn hems up all around both sails, and in this particular model, being so small, sew or glue the main sail to the mainmast and boom. If possible use fine wire rigging to the masthead and yardarm. Now complete the hull planking, assemble mast, mount rudder and solder tiller to rudder post, taking care it lies fore and aft when the rudder is dead straight astern.

Give all exposed and accessible surfaces heavy coats of dope and banana oil, then paint as desired. Assemble rigging and sails and prepare for the water. We would be pleased to answer any questions, and to receive photos and descriptions of your model (s).

NEWSREEL

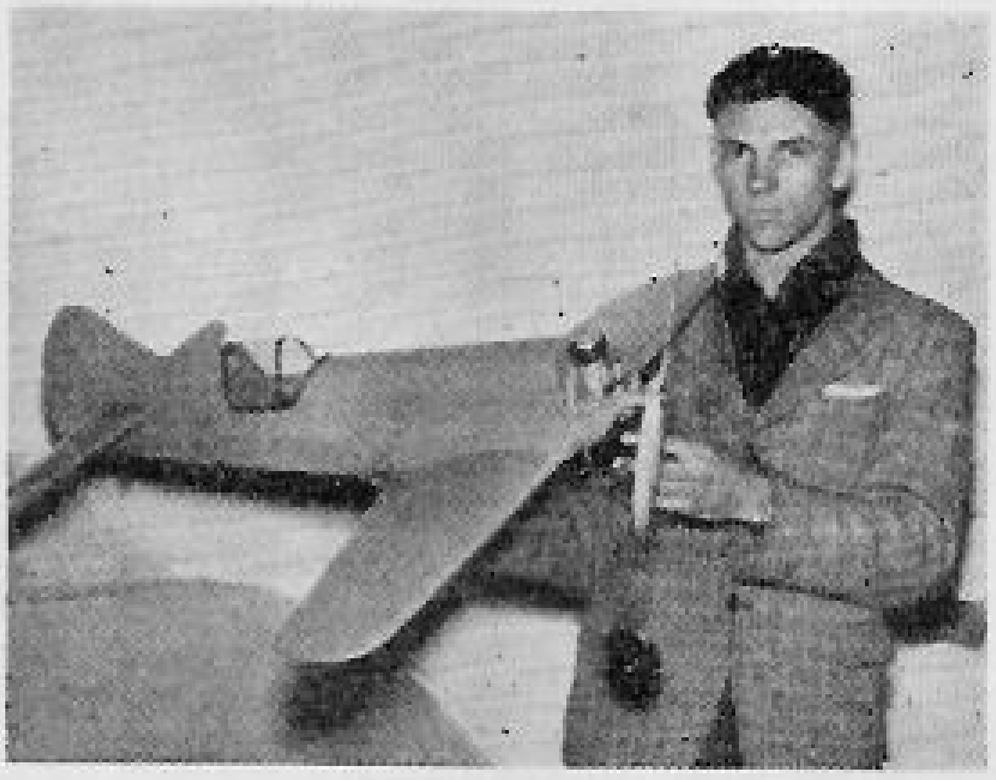
Harry Forrest's 1948 Wakefield, which is a fine example of the modern streamlined type. It has retractable undercarriage, single-bladed folding propeller and fuse-type dethermaliser. A stable model which should have been placed higher in the Wakefield Elimination this year, but owing to test flying in rain in the morning, the model received a soaking and lost its trim.

* * *



An advanced stunt model designed and built by Rupe Johnson, former top stunt man, was sold to Allan King, from whom it was borrowed by Norm Bell, who, although new to stunt flying, was soon performing inside and outside loops, inverted flight, etc. The capable Ted Gregory really showed the model's ability when it passed to his hands, till he splashed it on his third consecutive outside loop. The repaired model is now owned by Tony Farnan, who is taking his stunting seriously. Power plant is an old type Ohlsson 60.

* * *



South Australian Murray Matthews, a keen control-line flyer, with his latest, a Hearn's "Old Faithful" powered by a 10 c.c. glo-plug Jay-Bee motor. This model was built primarily for sport flying. Though not capable of spectacular stunting, the Jay-Bee tows it around at about 70 m.p.h.

* * *

Gordon Burford, S.A.'s most consistent stunt flyer, seen here starting the first control-liner built in this State. Inspired by Louis Garami's "Flounder," to which an extra wing was fitted, and powered by the original Gee Bee 5 c.c. diesel, this model performed some hair-raising antics with and without the help of Gordon. On one occasion, when flying indoors, at the Adelaide Exhibition in early 1947, the model dived into the hardwood floor, breaking the cylinder barrel in two. To contrast with this model, Gordon Burford's latest stunt model, powered by the same capacity motor, features a 360 square inch wing, and in his hands is capable of most known manoeuvres.

— PIPPIRIKI —

A 60", high performance, Class 'A' Model. Especially suited to the Elfin 1.8, and 'K' Falcon 2.c.c motors.

Designed by Wal. Reeves.

AUSTRALIAN MODEL HOBBIES

Typical Wing Rib — 25 required — cut from 1/16 sheet.

Half wing platform — cut from hard 1/4 sheet

Holes to accompodate dowels in knock off mount.

Dowel for attaching knock-off motor mount

Dowel for Tailplane attachment

Typical Tailplane Rib 11 required — cut from 1/16 sheet

1/16 sheet covering on top & bottom of centre-section

1/4 x 1/4 Ledding

1/16 Sheet Covering (Top & Bottom)

edge

Ply gussets

1/16 x 1/4" sheet between ribs

1/8 x 1/8 cross bracing

Add 1/4 x 1/16 cap strips top & bottom

1/8 sheet

1/2 x 1/8 leading edge

1/4 x 1/8 spar (top)

1/4 x 1/8 spar (bottom)

3/4 x 1/8 trailing edge

1/8 sheet

1/4 x 1/8 spar

Cut-out into which rib fitted Tailplane

1/8 sheet

Dowel for Tailplane attachment

1/8 stiffeners

wire glued into sub-rib

Scale of Inches

1 x 1/4 Trailing edge

Dihedral Break

1/16 sheet covering

Tailplane Detail

Wing Attachment Dowel

Crutch Method of Construction

See crutch detail

Cut from 1/8 sheet

Build crutch on plan first then add structure above & below this.

Dihedral Set-up

1/8 sheet

Sketch of Wing Construction

Undercart is built thus & sandwiched between ply as shown— this is then firmly cemented between hardwood portions of crutch.

Note incidence of Wing Platform

1/4 sheet

See Front View of fuselage

Cement well

Hardwood

1/16 sheet covering

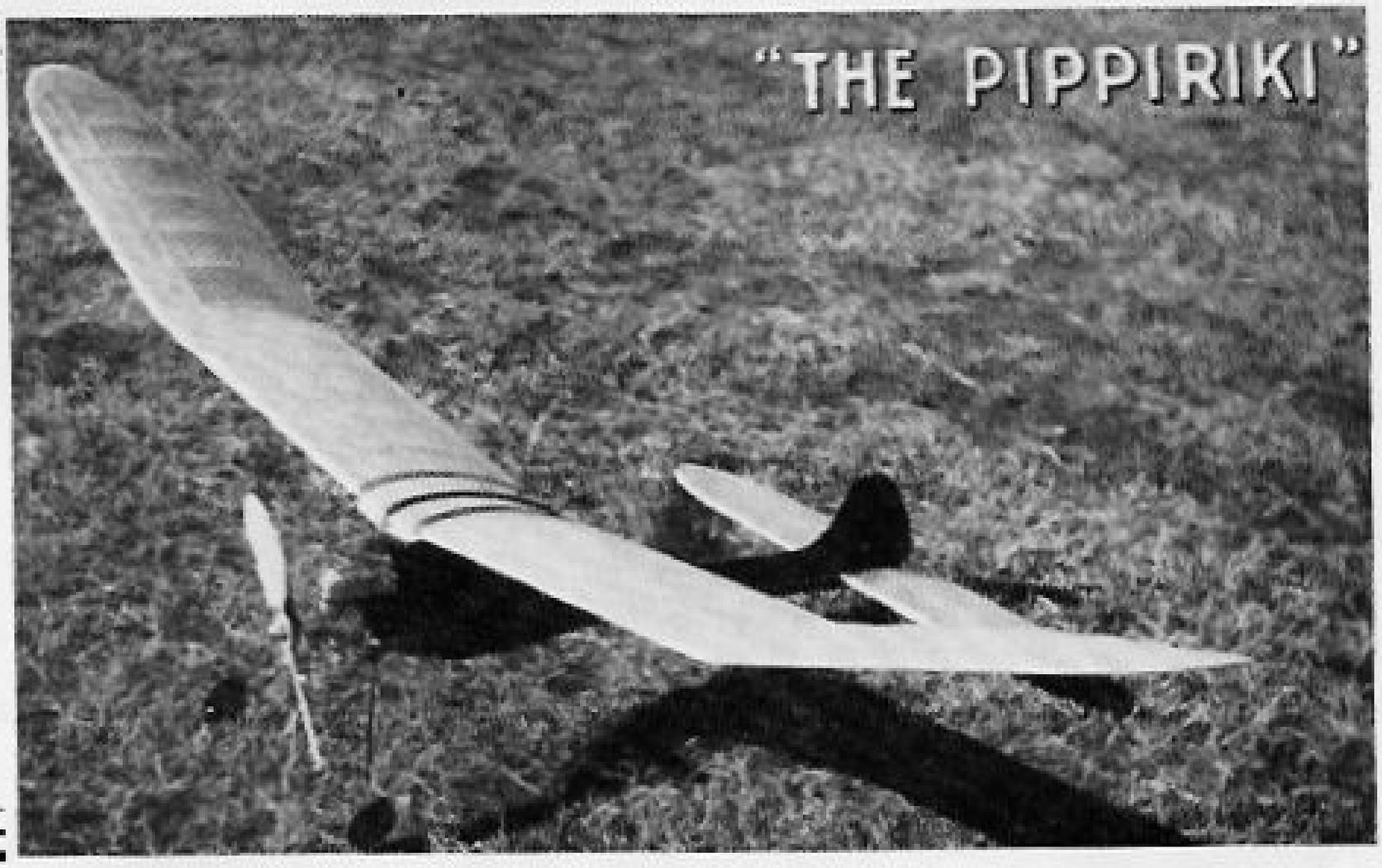
1/8 plywood.

Hard 1/8" bulkhead

1/4 x 1/4 hardwood

Crutch Detail — Build up from 1/4 x 1/4 balsa & hardwood as shown.

★
★ A SUCCESSFUL
★
★ FREE-FLIGHTER
★
★ SUITABLE FOR
★
★ 2 — 3.5 c.c.
★
★ DIESEL MOTORS
★



This model, along with the "Super Hatchet," has been the most outstanding in South Australia since the war.

Built around the general set-up of Don Foote's famous "Westerner," the "Pippiriki" performs in keeping with such a notable, if somewhat remote, ancestor.

Flown consistently by Wally Reeve, over the past months this model has out-flown most others, in State and interstate competitions.

The motor used is an "Elfin" 1.8 c.c., but as these are not readily available in Australia, a "K. Falcon" 2 c.c., is suggested.

The construction is quite orthodox, and is outlined below.

The model is trimmed to climb in a wide right circle and glide in a tighter right circle when motor cuts.

CONSTRUCTION

Full scale plans are available at the Hobby Stores from the A.M.H. Plans Service, and if you do not buy these the first job will be to scale up the plans given here to full size.

Fuselage:

Build up the central crutch from ½ inch square hard balsa, and ¼ inch by ½ inch hardwood (almost any hardwood can be used, though preferably spruce, birch, huon pine, or walnut). Use copious quantities of glue on the undercarriage fixture. Now build up the top and bottom frames as shown on the plan. The fin is built continuous with the fuselage. Take care to get the same incidence on wing and tailplane, with respect to the thrust line, as on the plan. Cover whole with strong tissue and give three coats of dope.

Wing and Tailplane:

These two frames are similar in construction, and perfectly orthodox. Note the 1-16 sheet top and bottom on the wing leading edge; choose light straight-grained wood and use slow-drying glue from a tube, plenty of pins, sandpaper and elbow grease. The 1-16 inch by ¼ inch capping strips (only one is shown on the plan) are glued to every rib, top and bottom.

Covering with tissue is an art that takes practice and experience—if you are new to aeromodelling try to make up for this by taking great car, getting an even tension, and if possible, no wrinkles, before doping. In future issues we will describe covering in detail, and many other tricks of the trade. Incidentally, do not forget to cut your rib template 1-16 inch in all around to allow for the capping strips and sheeting.

When fitting the cross-braces in the wing, do so while it is still pinned to the building board, and do not make the braces tight fits needing any pressure to put them in place; use rather loose or neat fits. Be sure the entire wing structure is dry before unpinning. These precautions help to prevent warps developing later. Another precaution many builders use is to pin the wing down again when doping.

(Continued on page 29)

AUSTRALIAN MODEL HOBBIES

STUNT DIESEL—BIPLANE

DESIGNED BY : GORDON BURFORD SOUTH AUST.

THIS MODEL IS ESPECIALLY SUITED TO THE 5c.c. DIESEL GEE-BEE SERIES OF MOTORS, AND WHEN SO POWERED IS FULLY AEROBATIC.

1 2 3 4 5 6 7 8

SCALE OF INCHES

WHEN FUSELAGE IS COMPLETED COVER WITH TISSUE AND DOPE— THIS GIVES MODEL MUCH GREATER STRENGTH AND PREVENTS SHATTERING IN THE EVENT OF A CRASH.

FUSELAGE IS BUILT UP FROM 1/8 SHEET TOP AND SIDES AND 1/8 FORMERS. (SEE SKETCH)

OVERFLOW

FUSELAGE DETAIL

1/4 SHEET

WEDGE TANK

1/16 SHEET COVERING

RUDDER IS CUT FROM 1/4 SHEET.

RUDDER IS LET INTO FUSELAGE

OVERFLOW

LINE GUIDES

COVER UNDER PORTION OF NOSE WITH 1MM PLY

HARD 1/4 SHEET SKID

HARD 1/4 BULKHEAD FACED WITH PLY

FILL IN WITH SCRAP

LINEN THREAD LOOPED ABOUT TAILPLANE AS SHOWN — GLUED AND CUT AT POINT 'A'

HINGE DETAIL.

FIGURE EIGHT LOOP ABOUT TAILPLANE SHOWN LOOSE.

ELEVATOR'S BUILT FROM 1/4 SHEET

CONTROL HORN IS CUT FROM SHEET ALUMINIUM AND BOLTED TO ELEVATOR

ADD EXTRA 1/8 SHEET ABOVE AND BELOW MOUNT AND GLUE WELL

DRILL TO SUIT MOTOR

STEEL WIRE CONTROL ROD

MOTOR MOUNT IS CUT FROM 3/8 PLYWOOD

RUDDER IS LET INTO FUSELAGE AND GLUED TO 1/8 SHEET SIDE.

SEE DETAIL FOR METHOD OF MAKING HINGES.

BIND UNDERCARRIAGE TO BULKHEAD WITH FINE WIRE AND GLUE WELL

COVER BOTTOM OF TOP CENTRE SECTION AND TOP OF LOWER CENTRE SECTION WITH 1/16 SHEET BALSA

LINE GUIDES ON LOWER WING ONLY

MAIN SPAR 5/8 x 1/4 HARD BALSA. (TOP & BOTTOM)

ALL RIBS CUT FROM HARD 1/8 BALSA

WING TIPS CARVED FROM SOFT BALSA.

TRAILING EDGE 1 x 1/4 HARD BALSA

THE WOMBAT

An Outstandingly Successful Stunt Controline Model Designed by Gordon Burford

Controline flying was beginning to lose a lot of its interest in South Australia, as to progress to a topnotch stunt controline flyer meant many crashed models and the time to build them, but when the biplane featured here made its appearance its ease of handling and stunt-ability brought most of the tiring stunt flyers back with renewed enthusiasm.

Three weeks after the Bipe's initial appearance the Australian Wakefield and Victorian Gala weekend was held and during the controline stunt contest which was part of the weekend's flying, four of these Bipes made themselves evident in the hands of visiting South Australian modellers, one of which came out on top in the hands of Bill Evans. None of these models had been flown before and two of them were fitted with new motors which had never been run in the models, and the old bogie "Mr. Bad Fuel Tank Set-up" was more than evident, but even so the Bipes managed to stagger through figure eights, loops and inverted flight and an outside loop, which because of the low general standing of the flying was sufficient to win the contest.

Gordon Burford, long the top man in S.A. stunt controline flying, made further progress with the aid of the Bipe to the stage where he must be second to none in Australia; his inverted take-off was a terrific surprise when first seen and as yet I don't think it has been repeated by other stunt men in Australia, although given a capable model no doubt some of the top liners would manage it.

South Australians are most keen to see Gordon clash with Ted Gregory—present Australian Stunt Champ—at the next National Championships.

Flying during the monthly controline day at Glenelg in May were at least eight Bipes all powered with the local "Gee Bee" motors and the noticeable progress the chaps made impressively demonstrated the virtues of the design.

Construction is simple and rugged and as the surfaces have a comparatively small moment of inertia, in the case of a crash very often the Bipe fares better than a monoplane of similar area. Just what makes this model rather better than average is not definitely clear, but we suggest that the large wing area for the low longitudinal moment of inertia enables, as long as sufficient power is present to overcome the undoubtedly high drag, stunt manoeuvres to be accomplished in small space, (i.e. tight loops, turns, etc.) and this is necessary for any top-flight stunt model. Note the similarity between the Wombat and such planes as De Bolt's Super Bipe and the one by Henry J. Nicholls; the latter is probably on the right line of development in using a laminar flow airfoil.

What are your ideas of biplanes versus monoplane for controline stunting?

Construction:

As with any and all models, the most important first move is to read the plan *thoroughly*. In this particular model there is almost no departure from orthodoxy, that is, in the construction.

Commencing with the fuselage, cut out the two sides from medium sheet, and sand. Assemble fuselage—this can be done using either $\frac{1}{8}$ in. sheet top and bottom, or building up with crossbraces, the former is stronger and advisable. See that the incidences of the two mainplanes are exactly right as this is most important on biplanes. The undercarriage and motor mount (beam) is well illustrated on the drawing and needs no further explanation. Should a "K" Vulture Competition Special, Amco 3.5, or any other radially mounted engine be used, it should be bolted directly to the front bulkhead, or held in place against it by rubber bands and accurately located by two studs. This latter method allows the thrust line to be altered with ease, and offers some insurance on the motor in the event of a crack-up.

Cut out the ribs, strip the various spars, and assemble both mainplanes by first mounting ribs on one of the mainspars of each wing, adding the other mainspar, the leading edge, and then the trailing edges. Leave to dry after checking that you are not building warps into the wings, turn to the stabiliser and rudder. These are cut from sheet. The rudder is mounted along the left hand corner of the fuselage so it causes the model to stay out on taut lines. The elevator hinges are made according to individual wishes, but that on several very successful copies of the Wombat is made by winding thread round stabiliser and elevator as shown, glueing close to the joint, and then cutting off the excess thread we are left with a particularly flexible yet steady hinge. Mount the stab. and attach the control horn on the elevator.

(Continued on page 28)

International Round-up

The *English Wakefield* Trials held at Fairlop on July 2nd, to select their team of six, were held on a warm sunny day. One hundred fliers, being top men in eliminations held throughout the country, battled to gain a place for the finals. The contest proved a triumph for *Roy Chesterton*, who gained the possible 15 minutes in three flights. It will be remembered that Roy was the 1948 Wakefield winner in America, and it remains to be seen whether he can pull it off again this year.

Well-known American builder, *Dick Korda*, is rising plug-in wings a la English style this year. *Chet. Lanzo* is also trying out the English design Wakefield.

The *Australian* and *New Zealand* entries were impounded by the customs at London Airport, but it is hoped they will be released by the contest date. *Frank Zaic*, noted model authority, intends being in England for the finals, and it will be interesting to learn if he is a member of the American team.

Noted American manufacturer and indoor builder, *Bill Atwood*, reports new trend in indoor design. Smaller size, but medium grade balsa used, instead of larger sized, lighter grade. Using tungsten or nichrome bracing, and with balsa selected as indicated, lighter, yet stronger wings may be constructed. *Frank Cummings*, after much experimentation, has come out with a microfilm solution commercially, which is said to be very good. *Hewitt Phillips*, back in 1938, wrote the endurance equation, then determined the optimum rubber/weight ratio for maximum endurance. Now *Hank Cole* goes further and includes structural factors to determine optimum aspect ratio, rubber-weight ratio, and optimum type of construction. His indoor model showed his work was worthwhile, for at the last American Nationals it flew for 23½ minutes on 2,000 turns. Motor will take 2,800 turns, so a 30 minute flight should be attained if and when a sufficiently high ceiling is obtained.

The American rules for 1949 were not greatly changed. No variation in indoor or free-flight gas regulations. To obtain official recognition for a record flight, necessary for a minimum of ten flyers to be entered in the Record Trial or Contest. Control-lines for speed lines must have diameter of .001 in. for each 2 ozs. of plane's weight. Line lengths increased to 52½ in. for Class A, 60 in. for Class B, and 70 in. lines for all Class C and D models.

For control-line stunt, landing gear is required, which may be fixed or retractable. R.O.G. is required, and no dollies are permitted in this event.

Well known pre-war expert American modeller, Roy Marquardt, famous for his well used successful aerofoil, the "Marquardt S2," now has his own aircraft company in U.S.A. and has been out of the model game for the last seven years, according to a letter received by us. Speed flier Troy Burris is now back in Uncle Sam's Airforce, and is flying the Airlift in Germany.

Famous racing pilot, Art Chester, was killed during the air races at San Diego on April 24th last, when his 'plane slipped in when rounding a pylon. He will be sadly missed as he has competed in most of the National Air Races held in America during the last decade.

The American west coast boys have fostered the introduction of control-line scale and semi-scale team racing which is expected to take on fast, and reports of contests held for these ships will be keenly awaited.

THE WOMBAT—Continued from page 27.

Now proceed with the bell crank and mount, remembering that this is the point at which the load of the stunting model is taken.

See to it not only that the actual pivot is well anchored, but also that its anchoring point is able to transmit the load to the fuselage without overstressing any part. Attach the push rod to bellcrank and elevator horn and check that sufficient movement is available in the elevator—at least 30 deg. up and down.

Cover and dope the wings and mount them firmly on the fuselage. Interplane struts are optional; they are certainly not essential. The wheels on the original are of solid rubber of low cross-sectional area; small air-wheels could be used, giving a little greater protection.

The only remaining job is painting, and attaching the wires. The original has checkered wings and all black body.

THE CHIPMUNK—Continued from page 8.

There are a number of small features not illustrated in detail on the plan. This is because most model builders have their own pet ways in such matters as pivot mounts, push rod guides, elevator hinges, etc., and to go into the various pros and cons would require several articles. This we will do if you, as readers, indicate that you want such articles; so write and tell us.

We would be very pleased to receive photos and reports of any models you make of the Chipmunk.

The Queensland Annuals

Two intrepid travellers left Adelaide on a motor bike at or about dawn on Friday, July 29th, bound, it was rumoured, for Brisbane, a city far over the curve of the earth. Preparations had been carried out in great secrecy in the coastal district of Glenelg, and on the final day large crates were seen being sent off—some say these contained supplies of methanol, benzine, kerosene, acetone, methyl ethyl ketone, castor oil, ether and nitromethane, fuels commonly used in motor bikes.

Word came back to those waiting anxiously at home, saying that our adventurers had passed through two small hitherto unknown towns called Selbourne and Mydney; then all contact was lost and grave fears were being felt for the safety of our heroes.

Then today, out of a glorious grey sky, we received a letter, airmail and express delivery. The shaky handwriting was just recognisable as belonging to Bill Evans, while the presence of Kev. Green could be felt in every line. Without more ado we herewith present this letter, entirely unexpurgated, containing as it does the story of the Queensland Annuals:

"After a journey of almost 1,700 miles to compete in the Queensland Annuals, we felt at the conclusion of the contests that the trip had been well worthwhile, and the experience was one of the most enjoyable flying weekends to date.

"The Meet opened with the sailplane and freeflight power events at Wacol Flying Field, situated some ten miles out of Brisbane. The Field is about a mile square, and is covered at the moment with high grass, which proved ideal for the power events, coupled as it was with a cleared take-off area and a plywood runway. Even so, many models had difficulty in R.O.G., which suggests that more thought must be given to undercarts and launching techniques.

"Most notable flight of the day was a sailplane flight of 31 minutes O.O.S. by Bill Weekes of Toowoomba, winning for him the open sailplane section. Kevin Green, of South Australia, won the freeflight diesel, flying a Vulture-powered "Supa-Hatchet" built by Rex Meyers of S.A. This model is a replica of that with which Bill Evans won the Australian Free Flight Championship in Sydney last November, plans of which appeared in the last issue of Australian Model Hobbies.

"Entries for the Freeflight Gas event were disappointing, but the winner, Don West, flying an 8-Ball design powered with an Ohlson 23 was one of the day's most consistent performers.

"Nial Hart, of Toowoomba, won the Jetex contest with a fine effort. An example of how not to light a Jetex motor was seen when Kev. Green's model went up in flames when attempting to light the fuse with a flaming (?) cigarette lighter.

"A new 3.5 Amco diesel being used by Bill Evans caused considerable comment and interest, but the model, still very new and relatively untested, proved too tricky in the air. Russell Watson-Wills' Ohlson-powered 'Banshee' showed rather vicious spiral tendencies on the day of the contest, though previously, judging by its past performances, it had become the hot favourite for the gas event. (Was this another case of over-adjusting for a contest in an effort to do more than ever before?—Ed.)

"An amazing occurrence was seen when the 'Fugitive' sailplane, flown by Harry Butler, spun out of the sky after a flight of over seven minutes. The lads claim this took place over a 'spin area,' over which no model has yet flown and not spun in. An interesting thought and quite feasible under certain circumstances.

"Archerfield Aerodrome was the venue for the control-line contest, flown on the Sunday. The Open Stunt Event was the best patronised, and good stunt flying was seen. Kev. Green, of S.A., flying a 'Supa Champeen,' gained first place, while Bill Evans placed second with a De Bolt 'Stuntwagon' and Arthur Wylde, of N.S.W., was third with an original design powered with a Super Cyclone. Peter Weaver (Hot Rock) and Bill Werkes (Champeen), of Brisbane and Toowoomba, respectively, tied for fourth place. All excepting Arthur Wylde were using Gee Bee diesels.

"The Speed Events were low in entries, but a young modeller from Newcastle, N.S.W., Ken Noonan, recorded some excellent times with an E.D. Competition Special Speed model, showing what can be done in speed with the small engines.

"A Hearns Tempest-powered, Sadler designed, 'Little Rock' flown by Bill Weekes created quite an impression, as although flying on a stunt type 10" x 12" propeller—necessary to get the model off the rough ground—it was the first time a true speed model had been successfully flown in Brisbane.

"The scale controline Grumman 'Hellcat,' flown by Nial Hart, was the obvious winner in its class.

"Criticisms of the Meet are few. A roped-off area around the take-off boards for the Freeflight models, and more defined circles for the controlining events, would probably have allowed a smoother flow of flights, but apart from this the weekend was well organised and conducted. A great deal of the credit must go to Harry Butler, Secretary of the M.A.A. of Queensland."

The Editor wishes to add his congratulations to those above, for what appears to have been a well organised Meet. The programme is simple but complete, and the twelve trophies presented are some indication of the time and effort that has been put into it.

PIPPIRIKI—Continued from page 25.

The tailplane ribs are not capped, but the centre section is covered with light 1-16 inch sheet in the same manner as the wing.

Motor Mount:

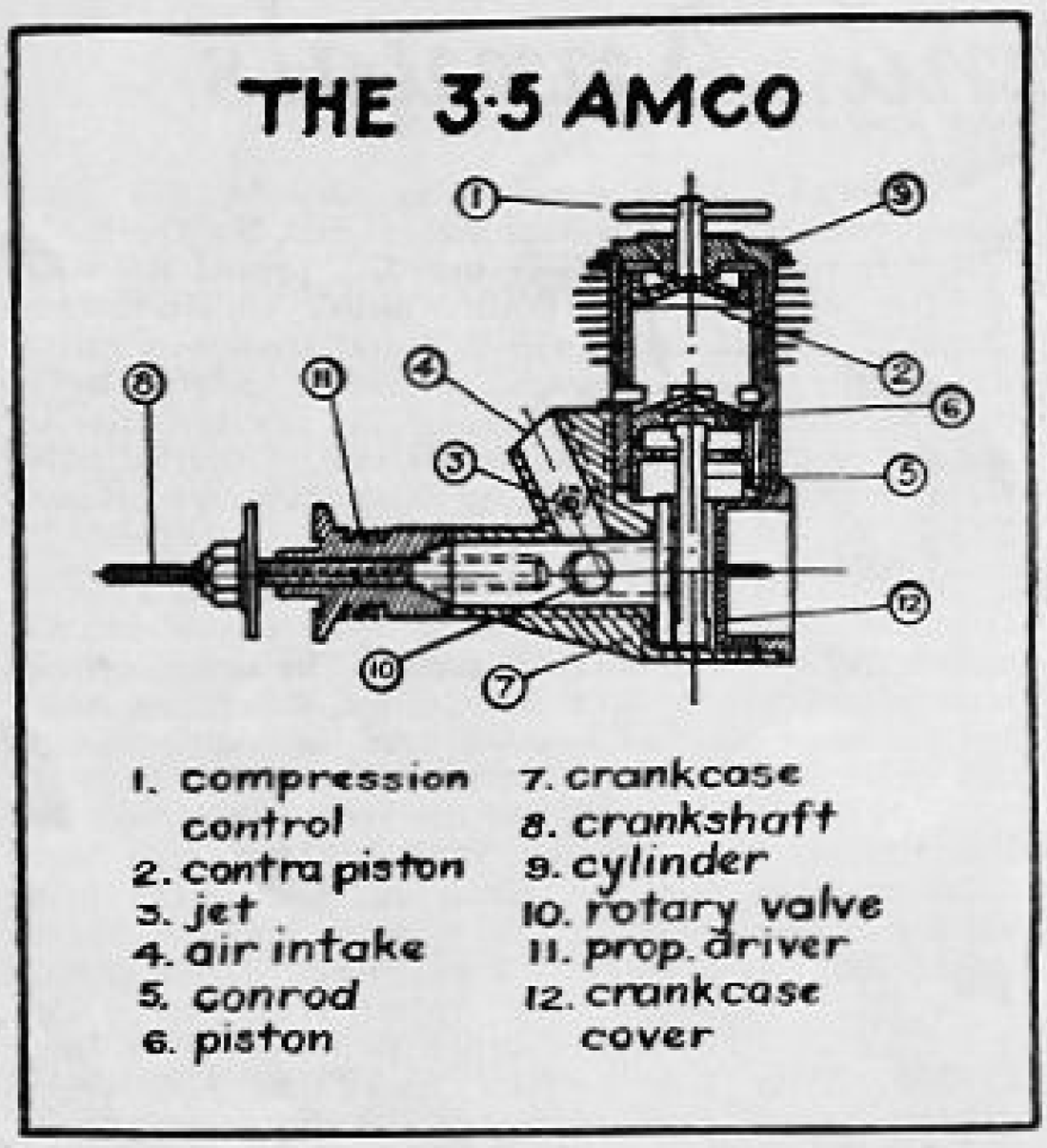
Trim a $\frac{1}{8}$ inch ply bulkhead the same size and shape as the front end of the fuselage. To this attach hardwood bearers to suit whichever motor you wish to use in your model. (Should you have a "K" Falcon 2 c.c. we suggest mounting it radially direct to the fuselage.) Add $\frac{1}{8}$ inch dowels to engage in the holes shown in the front view of the fuselage, and if desired drill a small hole laterally through both motor bearers and into it glue a length of 16 g. wire, round which may be wound the rubber bands holding the motor mount to the fuselage.

The fuel tank can be built into the wing mount part of the fuselage, with an access door for filling and maintenance.

Flying:

Check all surfaces for warps, and skewness, before taking to flying field. Test glide and change first stabiliser and then wing incidences until a smooth fastish glide results. Use low revs. and little fuel on the first flights, correcting any unpleasant tendencies by changes in side and down thrusts.

When the model is going well, experiment with different diameter and pitch propellers until you get the best possible results.



INTRODUCING THE "AMCO" 3.5 C.C. RACING DIESEL

High speed diesel designs comparable with the hot American motors, are now coming out of Britain, the latest of which is the motor featured this month.

The "Amco" 3.5 on test showed that it compared more than favourably with the top-line American .199 cubic inch glo-plug motor of similar design.

The makers' claims for this motor (the "Amco"), judging by claims of other manufacturers, are considered by us to be conservative.

On test running with a ten inch by six inch propellor, starting was found to be quite easy once compression and needle settings were found.

Said to be virtually designed on the flying field, this motor should meet the requirements of many Australian and overseas enthusiasts. Light weight, correct jet positioning for tank location, beam and radial mounting, and fair flexibility with fuels, are among its many outstanding features.

A point stressed in the motor instructions is to mount the engine rigidly, as—particularly with short-stroke motors—vibration means loss of power.

Another point mentioned by the manufacturers is that it is desirable to keep the control needle nob on the outside of the flight circle so that pressure fuel feed does not occur. Also care must be taken that the air intake is not screened from the incoming air stream by close cowlings.

85 to 90 m.p.h. is claimed with a ten to sixteen oz. stunt model, with a wing area of 200 to 280 square inches, with reasonable streamlining.

All "Amco" 3.5 engines are given a working test before leaving the factory, and must rev to a minimum of 9,500 r.p.m.

The power curve (supplied by manufacturers, and considered conservative by us) reveals an output practically constant from 9,000 to 13,000 r.p.m., which is exceptional for this type of engine.

A glo-plug head attachment is available but the makers say that no advantage is to be had by fitting a glo-plug excepting after the motor is worn to a stage when diesel operation is impractical, and we firmly believe this statement to be correct. We feel that an opinion expressed sometime ago, that, given time, designers would produce a racing diesel capable of equalling the much vaunted glo-plug motors ,has here been vindicated.

The actual capacity is 3.43 c.c.s (0.2005 cub. ins.), and weight without propeller is 3¾ ozs. This remarkably low weight has been achieved without visibly weak parts, and opens a new era for small speed controliners, as well as being ideally suited for high-performance free flight models. Recently the writer saw an Amco 3.5 in a gas model of some 600 sq. ins. wing area, and it had no trouble in hoisting the plane up at least as fast as the famous .199 Arden glo-plug engine. Surely, even if gradually, such performances must weaken the numbers of the glo-plug fraternity, seeing no battery and other starting accessories (with their accompanying troubles) are required.

BRIEF TECHNICAL DETAILS

Type: Compression ignition, Rotary valve induction, Two-stroke.

Mounting: Beam or Radial; Upright, horizontal, or inverted.

Capacity: 3.43 c.c.s i.e. 0.2005 cubic inches.

Weight: 3.75 ozs. Bore: 0.6875 in. Stroke: 0.5625 in.

Crankcase: Pressure diecast of L.A.C. 112A silicon alloy.

Cylinder: S.14 hafdened, ground and honed.

Piston: Specially developed Steel Alloy; heat-treated, ground and honed.

Crankshaft: S.11 hardened, tempered and ground.

Conrod: Pressure diecast of L.A.C. 112A silicon alloy.

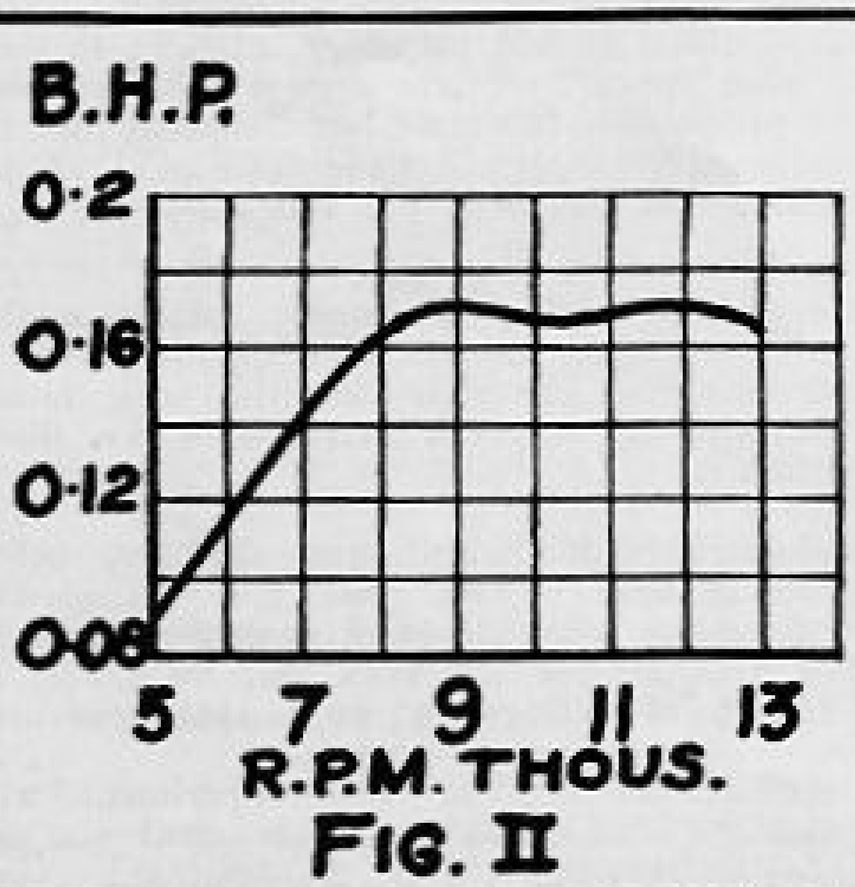
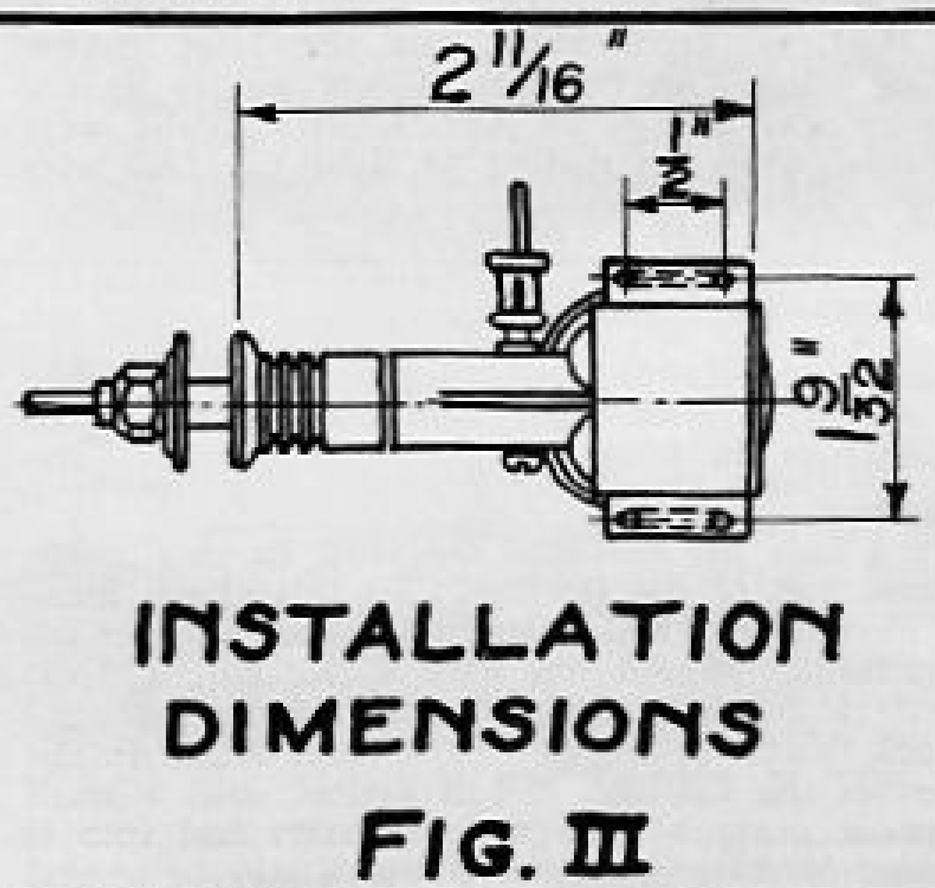


FIG. II



INSTALLATION DIMENSIONS

FIG. III

Model Aeronautical Association of New South Wales

East Coast Speed Club

The membership is closed to eight members only and operates on the same lines as the West Coast Speed Club in America. The members are as follows: Bill "The Master" Marden, who is our technical expert, and specialises in Class "D" Speed. We are glad to say that he considers his health is O.K. again, and just to prove it he clocked 120 m.p.h. with his old white speed job at the Club's second outing last Sunday.

Next is Harold Stevenson, also a Class "D" speed specialist. Harold has had a run of bad luck, but last Sunday his engane behaved exceptionally well and his best speed to date is over 110 m.p.h. Incidentally both Bill and Harold build their own motors.

In Class "C" we have Lance "Kiwi" Hopkins, who delights in flying speed jobs with stunt wings. He is a converted stunt man and just can't help doing wingovers. His best speed to date is unofficially over 100 m.p.h., but he holds the official Class "C" record for New South Wales of 84 m.p.h. Lance is at present building a "Little Rocket" for his McCoy 49, which should be ready soon.

In Class "B" we have Don McPhee and "Darkie" Luxford. We are expecting great things from them with their two new McCoy "29's" which are expected any day now. Don and Darkie will have the experience of Bill to help them in their training for speed flying.

In Class "A" we have John Bloodworth, who incidentally is our official timer. He has built a beautiful version of the "Whammy" for a McCoy "19." John was very keen on Class "D" for a long time and intended getting a McCoy "60" until one day I asked him to hold a Vibrotack on a "Marden 65" while it turned over at 14,000 r.p.m. That finished him. His nerves have never been the same since, so John is sticking to Class "A," not that I blame him, as those big motors really scream when running on nitro methane.

Scotty (the Association's Secretary) as usual falls for the job of organising our flying fields. He and Bill are cooking up a surprise.

Tony Marden (that's me) is specialising in Class "C2" and "D." My best speed with a McCoy "49" so far is 111 m.p.h., which I clocked last week. It's not a very high speed, but I have only flown it twice, during which time I realised that prop pitch would have to be increased. Furthermore, "The Master" hasn't tuned the motor yet. In Class "D" I haven't had sufficiently good times to comment, but hope to do so after my "Marden 65" has been run in and properly tuned. Well, chaps, that's all the news for this month, but will write again shortly. In the meantime, if anyone is interested in speed anywhere in Australia and we can be of any help, just write to me, c/o J. B. Scott, Box 2278, G.P.O., Sydney.

An important decision was reached by my Club at their last meeting, which was: to adopt the new American Academy Speed rules, which are one thou. for every 2 oz. weight of plane. This will no doubt cause considerable comment from some speed merchants as the line diameter will have to be increased and the line length will have to be increased also. If we are going to compete with America some day we may as well adopt the rules at once, otherwise our speeds would not be comparable with theirs should we fly on the shorter and thinner line. Again, a sudden switch over would necessitate experimenting with props at scratch again.

TONY MARDEN.

The Coming Nationals - - - Victoria, 1950

Readers will have seen the proposed Rules put forward in the August issue of "Aircraft." Here we offer a collective and we hope constructive criticism of these rules:

Most welcome, if the approach to Mr. Drakeford is successful, will be the proposed billets at Laverton. These would allow modellers to concentrate on repairs, etc., without inconveniencing others, would get the contestants from visiting States together, and would presumably be fairly cheap.

With many builders travelling 500 miles or more, is it reasonable to have only one afternoon, say three hours, for indoor flying? While this is not a well-patronised Section, the obvious thing is to try and make it so, and as the models take more care in handling than outdoor models, could not more time be devoted thereto, e.g. an afternoon and an evening?

In the outdoor rubber-powered events on the Saturday the three listed Sections are Wakefield, F.A.I., and Open for lads under 18 years. Now Wakefield and F.A.I. Rules are such that very similar models result. Our suggestion here is this: Wakefield, Open over 18, and Open under 18. *This would also reduce processing.*

The Stunt Rules are sound, but could not the speed models be flown under A.M.A. Rules.

In the Freeflight Gas and Diesel events the engine classing is simple and appropriate, with the proviso that a modeller with an under 3.5 c.c. motor can compete against the larger ones if he wishes; and we agree heartily with the five minute limit, encouraging as it does the use of dethermalisers, shorter chases and fewer lost models. We do feel, however, that the fairest measure of modellers' abilities is the flight ratio, and we hope the Rules will be altered to accommodate this.

A pleasing feature is the Novelty Contest for gas models, similar to the Bowden Contest in England, and to another recent suggestion by Jim Walker.

Since writing the above, the Editor has received the Rules set out below, as proposed for all Club, State and National Contests. He understands it has already received the approval of the M.A.A.'s of Queensland, New South Wales and South Australia.

PROPOSED RULES FOR ALL CLUB, STATE AND NATIONAL CONTESTS

We publish these for your perusal and comment:

1. Hand-launched Gliders.
2. Towline Gliders. F.A.I.
3. Rubber Endurance—Open. No weight rule. No limitation.
4. Wakefield—Wakefield Rules.
5. Free Flight Gas and Diesel. Suggested loadings are 6, 8 and 10 ozs. per c.c. (Queensland has approved 10 ozs. per c.c.) Unlimited motor run. Five minute time limit.

Speed Gas

Classes A, B, C and D American A.M.A. rules existing as at 30th June, 1949. Committee of three to check plane for safety and if any member of committee is doubtful plane to have 20 G test. All winning motors to be checked at the request of any competitor or official.

Jet: A.M.A. Rules.

Speed Diesel

Classes 1, 2 and 3 S.M.A.E. Rules. Line lengths 35 ft., 35 ft. and 52½ ft.

A.M.A. line diameters.

Stunt

S.M.A.E. rules with 'special manoeuvres' eliminated.
1. Motors up to and including 5 c.c.
2. Motors over 5 c.c.

Team Speed and Indoor Flying to be included in programme.

Indoor: Class A, up to 50 sq. in.; Class B, 50 to 150 sq. in.; Class C, over 150 sq. in.

(Why no event for unorthodox models?—Ed.)

Rules for Team Speed

1. Motor capacity not to exceed 5 c.c.
2. No mechanical starters permitted.
3. Wing area not to be less than 125 sq. in.
4. Motor must be completely cowled except for spark plug or compression adjustment lever.
5. Model must be of semi-scale appearance with cabin or cockpit containing a pilot bust to scale. The forward vision of the pilot must not be obscured when model is in normal flying attitude except when in true scale models.
6. Fuel tank capacity not to exceed one fluid oz.
7. Minimum race to be 5 miles (70 laps).

Racing Rules

1. All pilots must be in centre of circle before signal is given to start motors, and must remain there for the duration of the race. Motor and planes will be handled at all times by mechanic only.
2. Plane must fly low when being overtaken. No plane shall at any time exceed 30 feet altitude except in an emergency. Any plane being flown in an inconsiderate, careless or dangerous manner shall be disqualified.
3. The judge, who shall officiate as starter, shall be sole authority on all questions as to the race, entrants, and interpretation of rules, and his decision shall be final.
4. One lap-scorer shall be allowed for each plane.

"AND SO WE SAY"

(Opinions expressed in this column are not necessarily those of Australian Model Hobbies.)

The suggested new free flight rules of 10 ozs. per c.c. in A.M.H. (last issue) has caused much comment. Don't scream too soon! The 10 ozs. per c.c. is not as weighty as it may first appear, for when checking up how many "Frog 100," E.D. Bee, or similar powered jobs do you find much below the suggested 10 ozs.? How much would most models have to be weighed to be brought up to 20 ozs. for a 2 c.c.? I realise that the big 10 c.c. boys would have to add a mite to bring their models up to 100 ozs., but a good motor would get a six pound model under way quite well.

Better, cleaner designed models would, I think, be the natural outcome, and the smaller models would not be at the disadvantage as now with the 6 oz. per c.c. loading—what do you think?

Control-line flying: Team racing, promotion of which appears to be pulling control-line flying out of the rut in some quarters of the U.S.A., looks to be an excellent idea and Australian Clubs would do well to encourage similar racing before the control-line recession sets in, and those Clubs where they are already suffering from line exhaustion, a little added effort may get 'em in the circle again. Look out, Joe, I'm coming through.

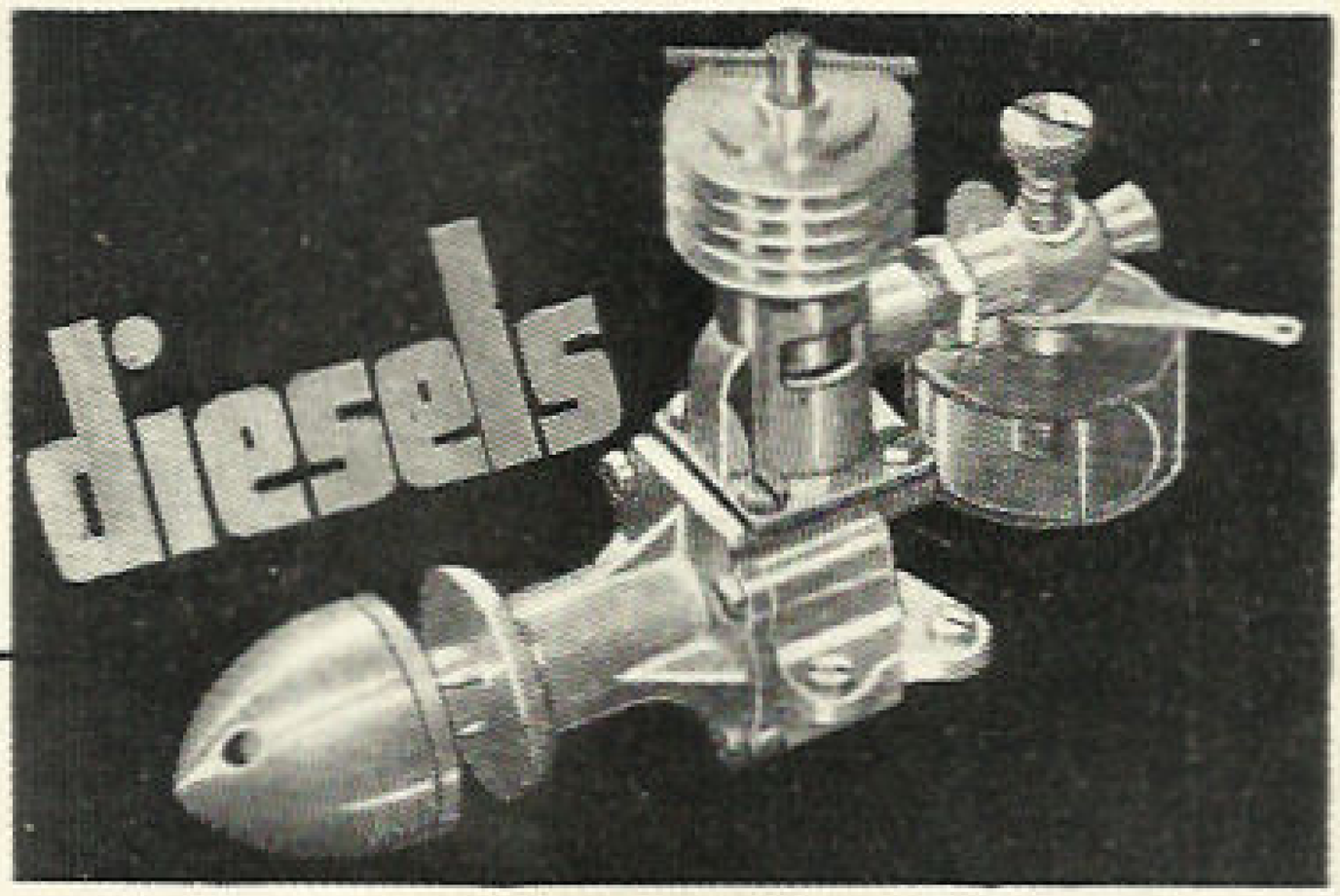
Constructive criticism of any aeromodelling activities are, I think, essential to progress, so pen me a few lines care of this column.

FAREWELL.

—MIRANDA

(Tale by Dunlop)

E.D. Diesels PROVIDE THE PROOF



The Mighty Atom—the E.D. 2 c.c. Competition Special which beat craft fitted with engines five times its cubic capacity.

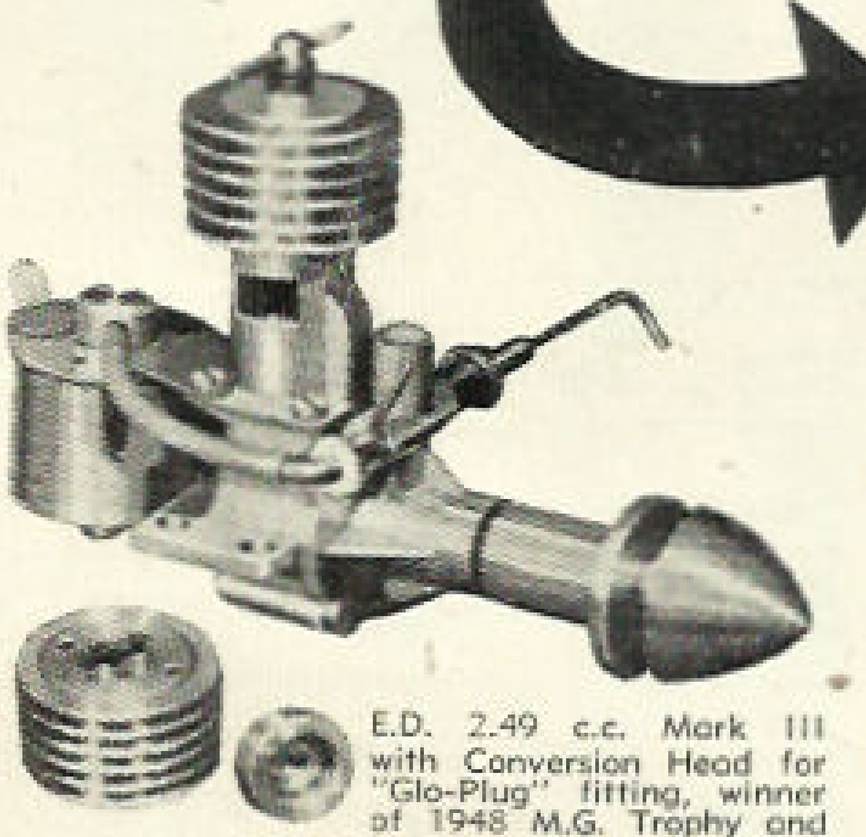
2cc Competition Special wins British Nationals Gold Cup in Control Line Competition!

E.D. Diesels go from success to success. Following the recent capture of the World's Speed Record for power units up to 5 c.c. (189.95 m.p.h.) for control-line claimed by Col. Taplin, the E.D. 2 c.c. Competition Special has now acquired the 1948 British Nationals Gold Cup in control-line competition in a British-made model aircraft designed by Mr. Percy Cocks, of Southhampton. This feat is all the more remarkable because the success was gained against all-comers—**including American 10 c.c. engines.** This amazing E.D. 2 c.c. Competition Special was a standard engine—just the same as you can buy from any Model Shop.

★

For 100% efficiency, outstanding performance and all-round satisfaction you cannot choose anything better than an E.D. Diesel—a product that upholds the high reputation of British engineering skill throughout the world.

★



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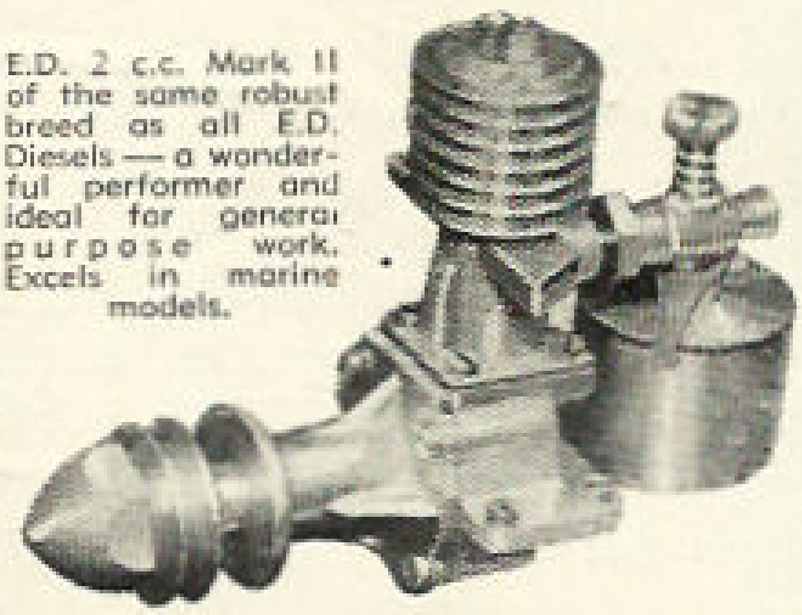

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