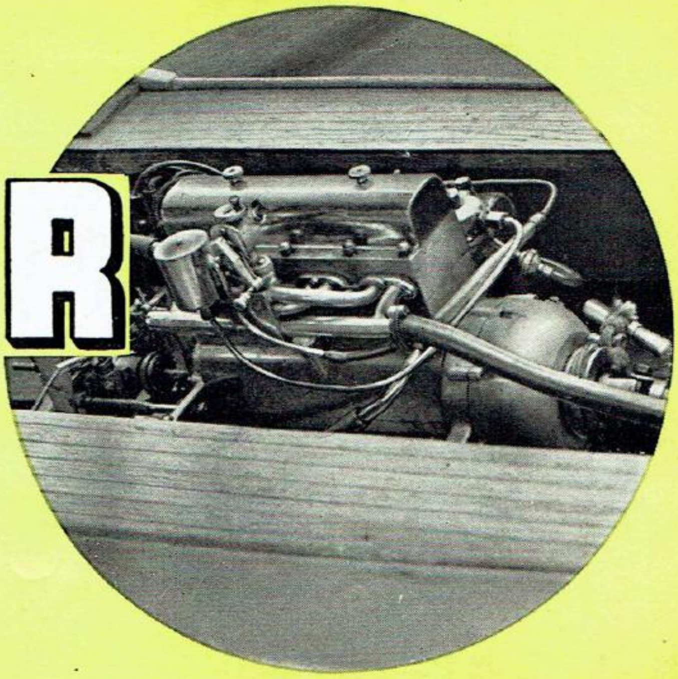
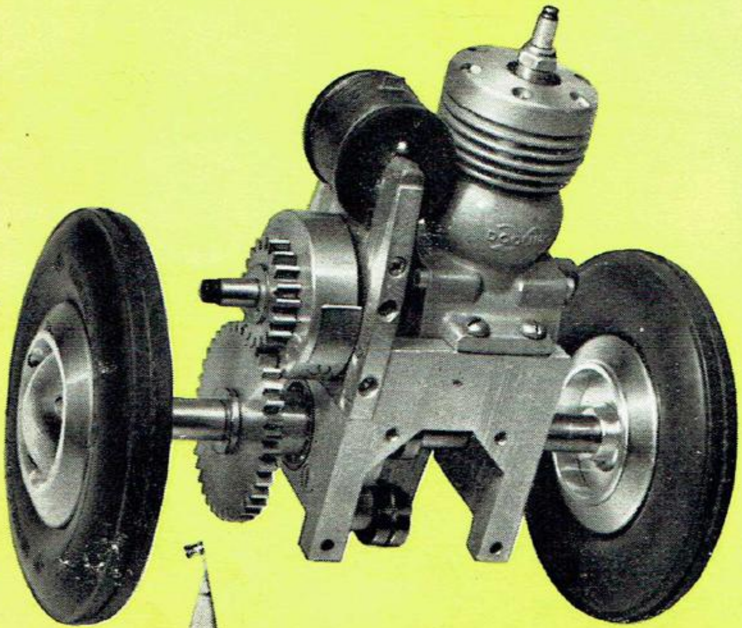
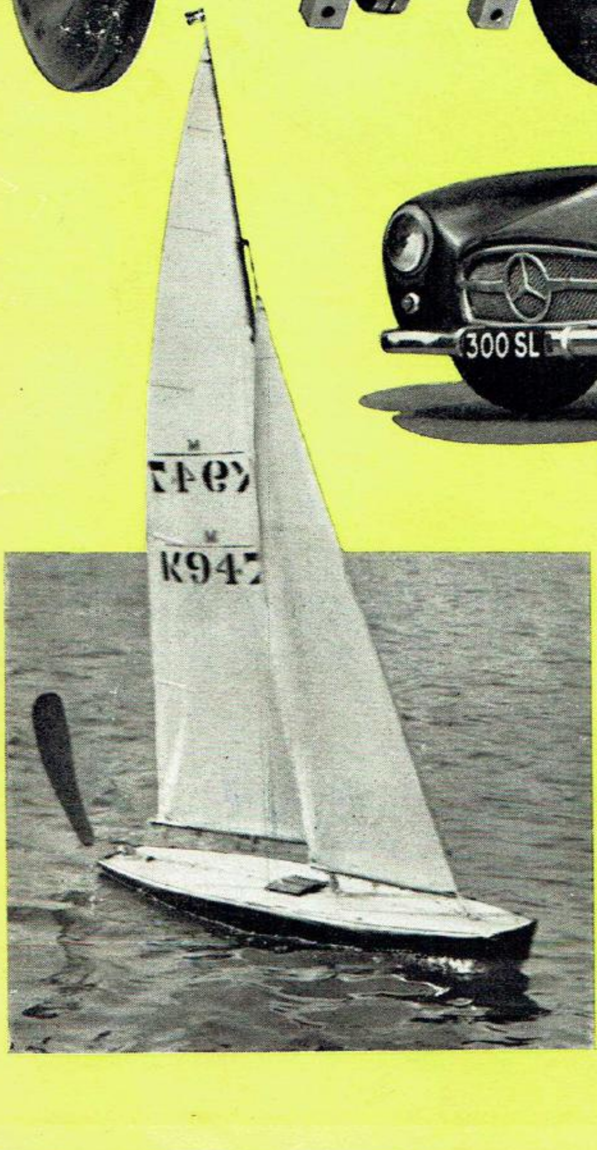
MODEL MAKER





JULY 1956



FIRST ELECTRIC RAIL TRACK IN U.S.A. OPENS : CANAL BOAT "FRANK RAYNER" : INTRODUCTION TO MODEL CAR RACING, Pt. II : MODELLING BY ELECTROLYSIS : NATIONAL MARBLEHEAD CHAMPIONSHIPS REPORTED : LOTUS Mk. IX MODEL FOR DIESEL POWER : "SCOOTER", A NEW AIRSCREW-DRIVEN HYDROPLANE : THE ALL-PURPOSE TOOL : THREE CONTROLS FROM SINGLE CHANNEL RADIO : "TARANAKI" CARGO BOAT, Pt. II : WELLING REGATTA IN PICTURES : ON THE RIGHT TACK : MODEL CAR NOTES : READERS WRITE : TEST BENCH : TUCKER'S TOPICAL TALKS : UNIVERSAL CALCULATOR

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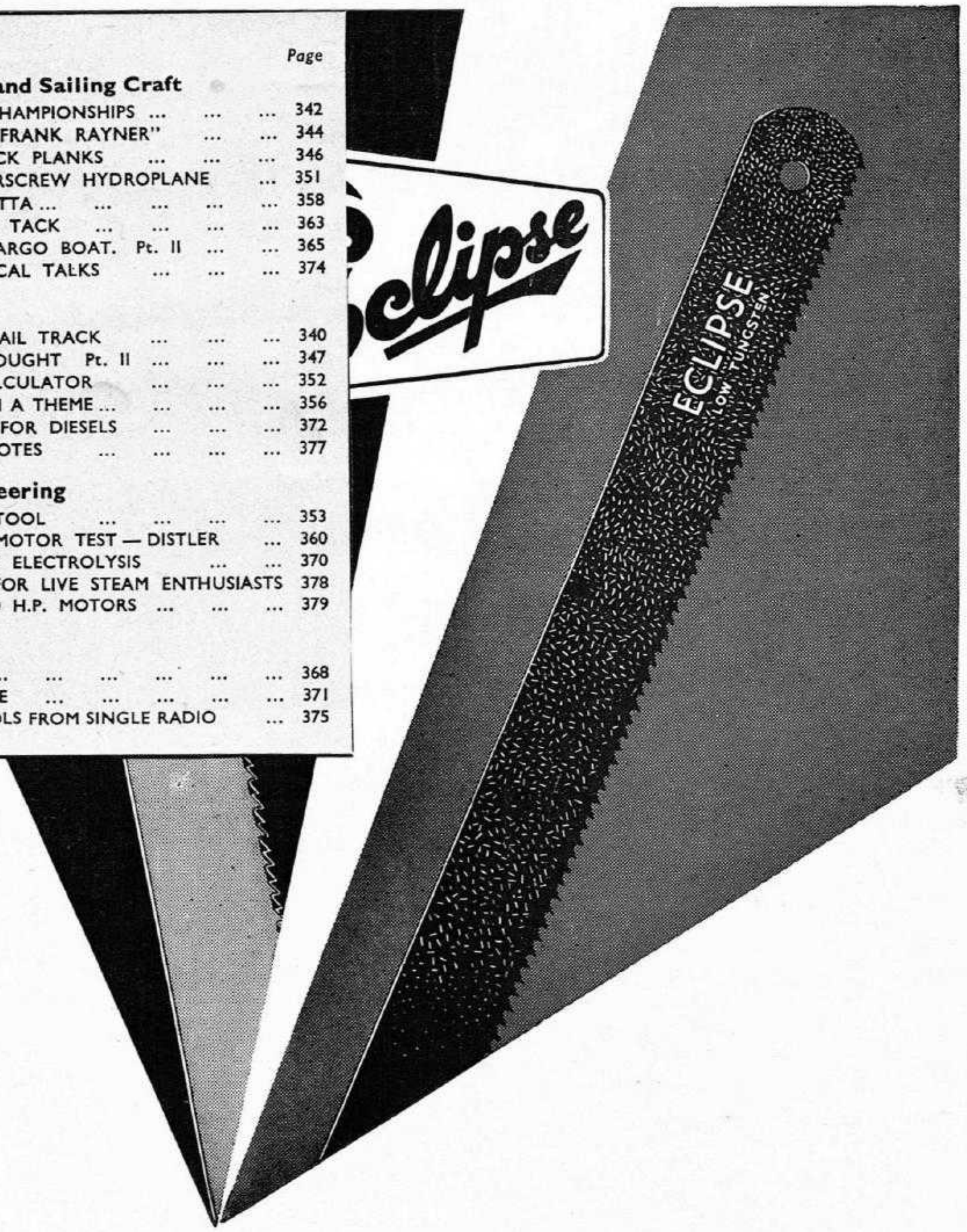
Contents



ON THE COVER . . .

Top right: A 20 c.c. O.H.V. 4-cylinder engine built by C. Washington of the Victoria Club.
Top left: One of Jim Dean's interesting engine and wheel units described in more detail in this issue.
Centre: Inspired by a recent M.M. article and based on M.M. scale plans this 300 SL Mercedes by S. Hutchinson of Stony Stratford is destined for r.c. operation.
Bottom: E. Gorse's *Gannet*, which came fourth in the National Marblehead event this year, with D. A. Macdonald as mate. Design is the latest Tucker "Duck".

Farthest travelled boat was *Varuna*, which came 300 miles from Ireland. Polythene is obviously difficult over there, hence the ingenious and decorative spinnaker!

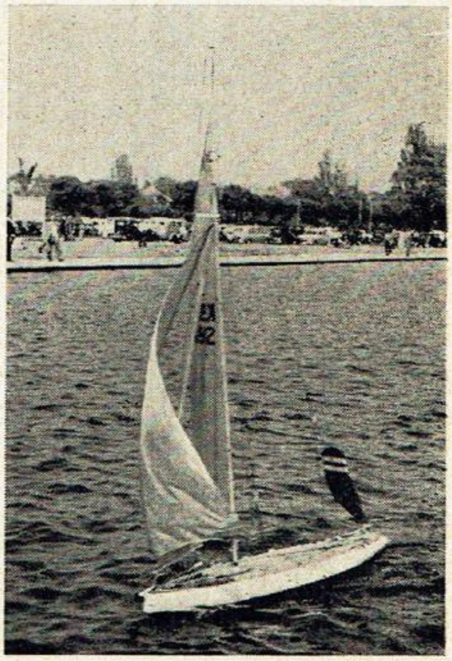
on the beat, but with the very light airs she did not do so well on the run. All boats suffered with the light winds and consequently many resails occurred. During Sunday afternoon the wind steadily decreased and by the time the fifth heat in the second round took place boats were almost stationary on the pond. This state of affairs caused all sorts of sights to occur (such as *Doris H* returning over the starting line after she had been half-way up the pond, and then only just losing the board), but it did not last long, and the breeze increased again to give a run and a beat for the last two heats of the day. It was during this period that *Triumph* gained her real supremacy, only dropping seven points all the afternoon. Results for the leading boats up to the end of the second day were as follows:—*Triumph,* 95; *Hopalong,* 80; *Anemone,* 80; *Doris H,* 78; *Foxtrot,* 76; *Gannet,* 72½.

Monday opened with a steady breeze from the N.W., although still light. The main point of interest lay in finding out if *Triumph* could hold her lead in the face of such seasoned opposition as *Foxtrot, Doris H,* and *Hopalong,* all of whom she had to sail. As in the previous round, the Daniels'-designed *Doris H* gained the full points, she being the only yacht to beat *Triumph* each way in the contest. A light boat, built by Levison, *Triumph* has always proved to be equal to the others, and on this day it proved no exception, as she retained her lead of 11 points to win the championship, the first time a national trophy has been held by the Dovercourt club. The position for second place was not settled until the last board. On Monday morning, *Doris H* and *Anemone* sailed each other, *Anemone* winning the beat by a very short distance, and the return run being a dead-heat. In the last heat of the day however, both yachts gained full points, leaving *Doris H* second, *Anemone* third and *Gannet* fourth.

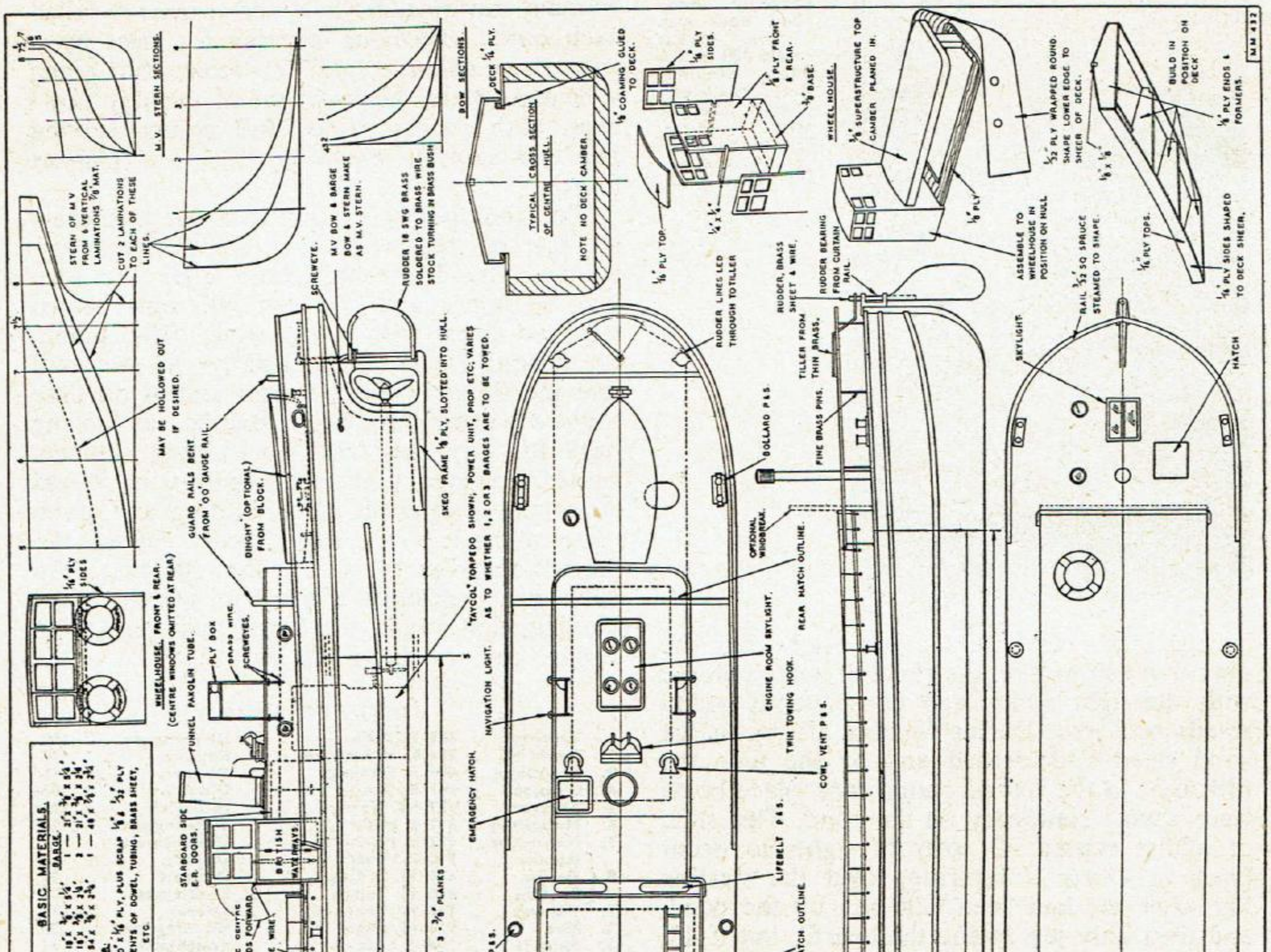
The championship proved a great success in spite of the poor entry. The Ulster competitor, Mr. Tregenna, stated after the race that he considered that the 600 mile return trip had been well worth while. The sailing throughout the contest called for all the skill that the skippers could muster and at no time could the event have been described as "in the bag" for any particular boat. Most skippers agreed, however, that a little more wind would have made the event more exciting and given some of the heavier boats a better chance. An interesting point to note is that the three top boats bear registration numbers under "500", proving that, with the right skippers, these designs can still head the list.

FINAL POSITIONS

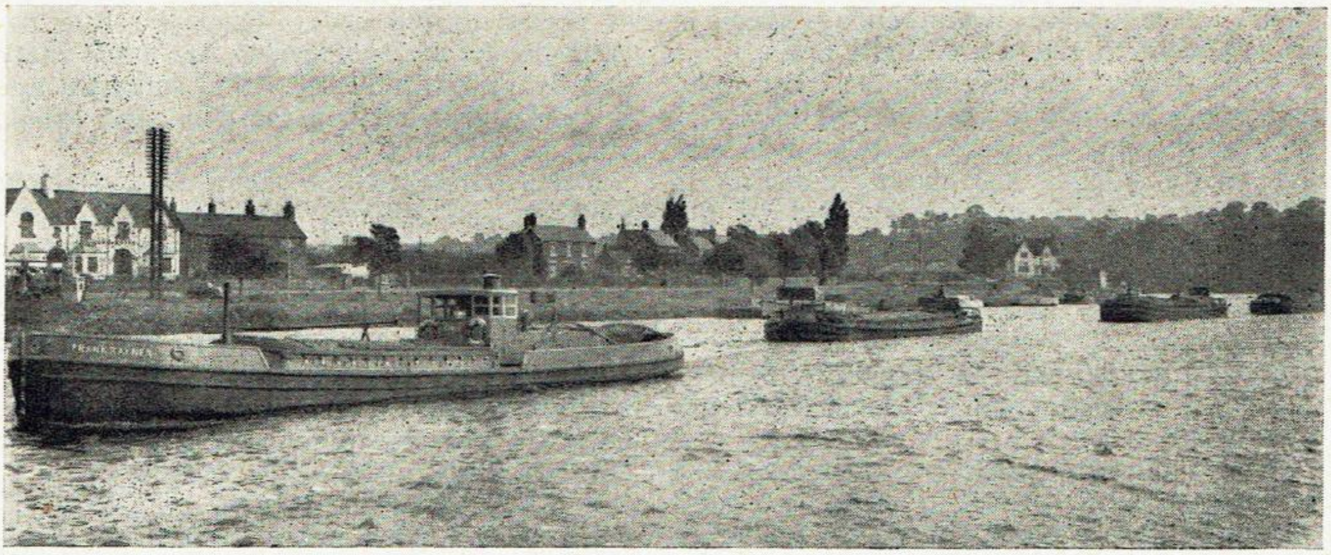
1.	Triumph	482	B. Dale	Dovercourt	128
2.	Doris H.	224	L. Wareham	London	117
3.	Anemone	498	F. Fitzjohn	Danson	115
4.	Gannet	947	E. Gorse	Clapham	103½
5.	Foxtrot	927	W. Grint	Norwich	102
6.	Hopalong	932	J. Meir	Birmingham	98
7.	Nicolette	952	S. Nicholls	Dovercourt	97
8.	Alexia	718	J. Watts	Danson	87
8.	Emma	680	H. F. Day	Danson	87
8.	Scottie	876	H. Death	Southgate	87
11.	Varuna	979	H. Tregenna	Ulster	76
12.	Zoe	912	H. Penn	Birmingham	72
13.	Skua II	378	J. Liddle	Southgate	71
14.	Letitia-May	945	R. Thorogood	Southgate	63
15.	Comet	631	P. Mustil	Birkenhead	61
16.	Spero	968	K. Roberts	Birkenhead	59½
17.	Flamingo	728	G. Brown	Birmingham	54
18.	Virgo IV	953	H. Howlett	Dovercourt	52



Sixth place went to *Hopalong* which also placed sixth last year, but won MODEL MAKER trophy earlier this season. Skipper Meir visible behind *Triumph*, opposite page



M.V. FRANK RAYNER AND STANDARD TRENT BARGE
SCALE: 3/16" : 1 FT.
DESIGNED BY Vic Smeed
COPYRIGHT OF MODEL MAKER PLANS SERVICE
38, CLARENDON RD., WATFORD, HERTS.
5/6
MM 432
BUILDING PROCEDURE.
1. GLUE UP BOW & STERN BLOCKS
2. FINISH INNER FACES OF BLOCKS, GLUE & DOWEL TO CENTRE PLANKS.
3. CARVE HULL TO SHAPE.
4. CUT & FIT DECK, ADD SUPERSTRUCTURE, ETC.
COLOURS.
HULL — MID GREY
RUBBING STRIPS DARK GREY
SUPERSTRUCTURE — RED.
BULWARKS — BLACK OUTSIDE MID GREY INSIDE.
FUNNEL — MID GREY.
TOPS — GREEN.
DECK — DULL RED.
BASIC MATERIALS.
HATCH FORMERS.
M.V. STERN SECTIONS.
BOW SECTIONS.
TYPICAL CROSS SECTION OF CENTRE HULL.
NOTE NO DECK CAMBER.
WHEELHOUSE.
WHEELHOUSE, FRONT & REAR. (CENTRE WINDOWS OMITTED AT REAR)
FUNNEL PAXOLIN TUBE.
GUARD RAILS BENT FROM '00' GAUGE RAIL.
DINGHY (OPTIONAL) FROM BLOCK.
MAY BE HOLLOWED OUT IF DESIRED.
SKEG FRAME 1/8" PLY, SLOTTED INTO HULL.
'TAYCOL' TORPEDO SHOWN; POWER UNIT, PROP ETC. VARIES AS TO WHETHER 1, 2 OR 3 BARGES ARE TO BE TOWED.
HULL BETWEEN STATIONS 4 & 5 FROM 3 - 3/8" PLANKS
NAVIGATION LIGHT.
EMERGENCY HATCH.
SINGLE BOLLARD P & S.
MAST TABERNACLE.
DECK LIGHT.
HATCH TO LIVING QUARTERS.
ENGINE ROOM SKYLIGHT.
TWIN TOWING HOOK.
COWL VENT P & S.
LIFEBELT P & S.
FORE HATCH OUTLINE.
REAR HATCH OUTLINE.
LADDER, STOWED ON HATCH.
LAYSTRATE WIRE.
LIVING QUARTERS STOVE CHIMNEY, BOTH FORE & AFT ON BARGE.
BOLLARD P & S.
DECK LIGHT P & S.
BARGE, WITH ACCOMMODATION FOR TWO FAMILIES.
HULL CENTRE 3 - 3/8" PLANKS
RUDDER LINES LED THROUGH TO TILLER
RUDDER, BRASS SHEET & WIRE.
RUDDER BEARING FROM CURTAIN RAIL.
TILLER FROM THIN BRASS.
FINE BRASS PINS.
SKYLIGHT.
HATCH.
TOWING BITT & ANCHOR HAND WINDLASS.
CHAIN STOWED.
TOWLINE WINDLASS.
SINGLE DAVIT
HAND WINDLASS FROM SCRAP.
MAST FROM DOWEL.
CHIMNEY FROM BRASS OR PAXOLIN TUBE.
TABERNACLE FROM BRASS SCRAP
TEMPORARY MAST CRUTCH.
FRANK RAYNER
BRITISH WATERWAYS
STARBOARD SIDE E.R. DOORS.
ASSEMBLE TO WHEELHOUSE IN POSITION ON HULL.
BUILD IN POSITION ON DECK



SOMETHING A LITTLE DIFFERENT FOR THE SCALE BOAT MODELLER

M.V. FRANK RAYNER

WITH STANDARD TRENT BARGES

DESIGNED BY VIC SMEED

SOME radio enthusiasts seem to experience difficulty in getting all their equipment into a boat hull, and an obvious answer seems to be to carry the equipment in one hull and batteries, etc., in another, which suggests either a catamaran or a towed barge. In presenting this model we are going one (or two) better since the normal complement of barges is three! Thus, the motor vessel can carry all the radio equipment and, of course, the propulsive mechanism, while the first barge carries the radio batteries and the second the main propulsion batteries. The third makes a useful place to store replacement batteries!

The *Frank Rayner* is a motor vessel typical of those plying between the Humber ports and the Midlands, under the aegeus of British Waterways. The vessel has an overall length of 82 ft. 6 in. with a beam of 14 ft. 8 in., and has a towing capacity of over 500 tons, provided by a 255 b.h.p. diesel engine. Apart from the engine room there is cargo space and living accommodation for a crew of three adults.

The standard Trent barges normally towed are also 82 ft. 6 in. in length by 14 ft. 8 in. beam, and each has a carrying capacity of 140 tons with living quarters for two families.

The plan gives full details for both the motor vessel and the barge, and it will at once be apparent that these are extremely simple models. As the construction of the barge is identical we will confine our remarks to the building of the power craft.

Construction

Since the whole of the centre portion of the boat is constant in section, and is very much a box-like structure, the obvious method of building this part is to use three planks of sufficient thickness to enable the section to be planed into the outside. The bluff bow and counter stern are a little trickier. and are best laminated from timber and carved to shape. The beam of the model permits six vertical planks, $\frac{7}{8}$in. thickness, to be used, and this is convenient since 1in. prepared timber has a normal finished thickness of $\frac{7}{8}$in.

The centre portion of the hull can be glued up and set aside to dry while the end pieces are cut; after laminating together the ends require to be finished on their inside faces, when they can be dowelled to the centre portion of the hull assembly and allowed to dry out thoroughly.

The exterior of the hull can now be shaped, using a small plane, spokeshave, rasp, etc. It is not necessary to hollow the bow and stern blocks, but if extra room is required inside this can of course be carried out. A slot must be cut in the bow and stern for the $\frac{1}{8}$ ply stem and skeg. Note that no particular wood is specified for the hull itself, although an obvious choice would be obechi. However, any of the normal boat-building timbers can be used, and provided adequate

Heading picture shows *Frank Rayner* en route Hull to Nottingham, just after leaving Gunthorpe Lock. Note that the three barges being towed all have wind breaks aft

steps are taken for waterproofing, there is no objection to the use of hard balsa.

After drilling through for the stern tube and fitting the tube in position, the stem and skeg pieces may be glued in their slots and the rudder fitted. The motor mounting is rudimentary, being greatly simplified by the flat floor; it is just a question of glueing packing blocks to the floor to suit the height of the particular unit in use. Naturally, if you propose to tow three barges, a more powerful motor will be necessary than if the tug is to be run solo or loaded with only one barge.

When internal details are complete two or three coats of varnish or white lead paint should be flowed inside and on the underside of the deck before attaching the deck.

One feature which makes the model very easy is the absence of deck camber, and the amount of sheer required can easily be bent into the 1/16-ply deck without recourse to steaming. The hatch sides must be cut to match the sheer, and they should be pinned in place on the deck while the hatch itself is assembled. As many hatch formers as desired may be fitted, but it should not be necessary to use more than two formers in the m.v., and three for the barges, in addition of course to the ends. Once the glue has dried on the ply roof panels, the hatch shape will be permanently set. The superstructure is clearly explained on the plan, and should offer no difficulty.

Further simplicity is offered in the colour scheme and fittings, especially in respect of the deck, which does not show planking in the normal way but is covered with a composition and can thus be painted the dull reddish colour of "compo." The hull exterior is all mid-grey, with the rubbing strips or wales a slightly darker grey. The insides of the bulwarks are the same dull grey; outside they are blask, with white lettering.

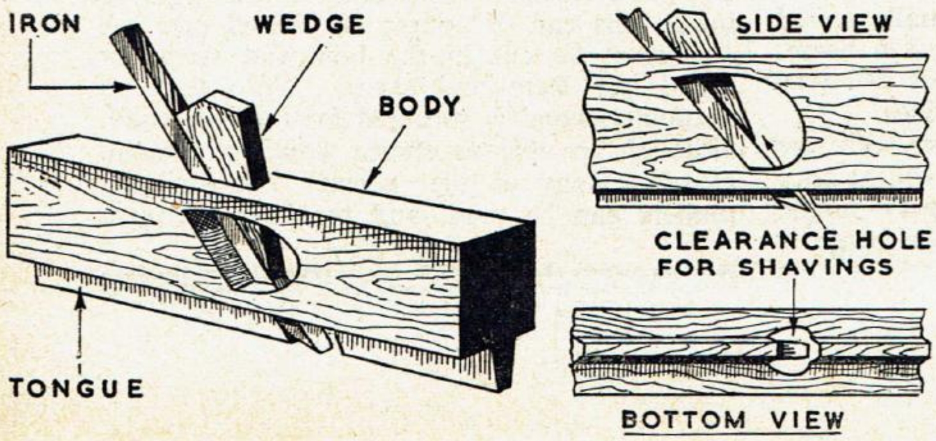
A dark red paint is used on the superstructure and hatch sides, the hatch top being "tarpaulin green" and the wheelhouse top and funnel mid-grey. Lifebelts are red and white, cowl vents red, and other fittings natural colours or red oxide.

The barge (or barges) follows the same order of construction, the only difference being that each end is identical and thus the centre "box" longer, and, of course, the fittings and details are not quite the same. In colour, the chief difference is that the outside of the small bow bulwark is painted white as a visual aid in poor visibility or at night.

PLANE IN YOUR DECK PLANKING —— *suggests B. H. Osborne*

THE usual way for making ply decking for model boats is by lines drawn in pencil or ink. Feeling that a more authentic finish could be achieved, I manufactured a small grooving plane to this end. All that was required was a length of a square section needle file approx. 5/64 in. x $2\frac{1}{2}$ in., and a spare piece of boxwood ruler which measured $\frac{3}{4}$ in. x $\frac{1}{4}$ in. x $2\frac{3}{4}$ in. The "iron" was sharpened with a cutting angle of 30°. This was used as a chisel to cut out the groove in which it lies in the plane—a guide hole being previously drilled through at an angle greater than 30°. The cutting iron was then sharpened to a cutting width 1/32 in., and inserted in the plane. Provision was made in the body of the plane for a small boxwood wedge to hold the cutting blade steady. The base of the plane was then rebated to the depth of an $\frac{1}{8}$ in. on either side of the cutting iron. The remaining tongue of wood was 1/32 in. wide, strong enough to withstand the pressures used in normal planing. The plane is used in conjunction with a straight edge.

A simple tool of this nature, which could be easily made by other model makers to make their decking more realistic, is limited in its use to cutting along straight lines, though no doubt by restricting the amount of tongue on the base of the plane a gentle curve could be obtained.



This does not cover the cost of the engine. I have left a lot to the builder's powers of improvisation, the machining, etc. Such a car should last two seasons at least. The cost of fuel and oil depends on how serious your racing is going to be. A bottle of fuel, 10 oz. size, will cost from 2s. 6d. to 3s. 6d. and such a bottle should last a compression ignition engine at least two meetings, depending on the amount of practising which is going to be undertaken. Racing fuel is very expensive, but a cheap running fuel can be made from:— ⅓ Paraffin, ⅓ Ether, ⅓ Castor Oil.

Next a few words about tools and equipment, a very important subject. May I make one point before I start, forget the "Bargain Department" when it comes to tools and Cable Car parts. There never has been, never is, and never will be a good and reliable tool made by a reputed manufacturer to be picked up cheaply in a Bargain Department.

Your club fee will cover you as far as insurance goes, as long as the club is affiliated to the Model Car Association. A charge of one shilling is usually made on each car as an entry fee at a meeting, this money goes towards prizes, etc.

One further point—do not think twice about the person who will tell you that you are wasting your time, remember it is **your** time, don't stop. If you want to succeed, if you want to race, then nothing and no one will stop you. Go ahead, but be sure of what you want, remember the success of your venture depends on how much time, trouble, and to a degree, money you are willing to put into it.

Lastly, I should like to claim the reader's indulgence for any inaccuracies. I have tried to get my facts right. I have tried to put down on paper my experiences for the help of others, but I do not claim to be an expert in any sense of the word. The object from start to finish has been to help. I am sorry if I have trodden on any one's toes. If I have in the last two months started a line of thought off in some one's mind, that will bring him to the starting line one day, then I shall be fully satisfied, and if at any time I can help anyone who is keen to race, no matter on how small a scale, it will give me the greatest possible pleasure.

KEN PROCTER'S CALCULATOR FOR MODEL RACING CAR DESIGN *(from page 352)*

the axis and rotated until free and smooth action is obtained. Put glue on top of axis and centralise the Retaining Disc on top of this using the dotted circle on the upper rotating disc (No. 2) to ensure concentricity.

When the glue has set, the calculator is complete and ready for action, a simple set of abbreviated instructions being printed on the retaining disc. Though the instructions give a certain sequence, it should be obvious that once the principle of operation is mastered, the reverse sequence is equally applicable or, one can start in the middle and work outwards if necessary to solve a particular problem.

The calibration of the various scales has been left fairly "open" since it is relatively easy to estimate intermediate points. One or two examples can perhaps be followed before the reader sets forward to solve his own problems.

Ex. (a) Direct drive car (no gears) 2 in. driving wheels. Maximum output at 14,500 r.p.m.

(1) Set Gear Ratio Index to 1 (direct drive is equivalent to 1:1).

(2) Rotate r.p.m. disc *only* until diam. index (10) is pointing to 2 in. wheel diam.

(3) Speed at 14,500 r.p.m. is approximately 86 m.p.h.

Ex. (b) Gear Ratio 1.75:1. Wheel Dia. 3¾ in. Engine r.p.m. 20,500.

(1) Set Gear Ratio Index at 1.75 (estimate this between 1.8 and 1.7).

(2) Rotate r.p.m. disc *only* until index (diam.) points to 3¾ in.

(3) Speed at 20,500 r.p.m. is 131 m.p.h.

In order to illustrate a "reverse" process:—

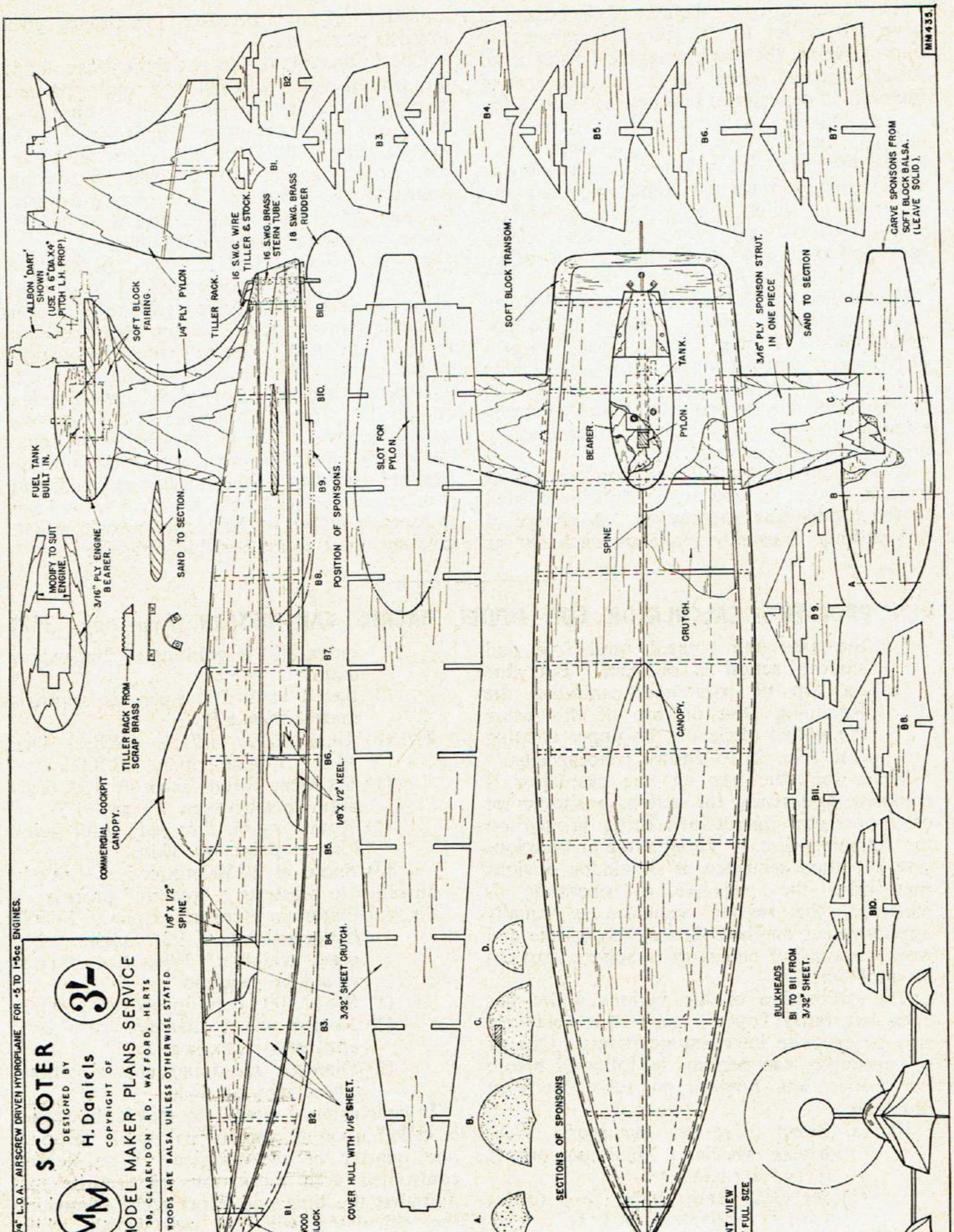
Ex. (c) Optimum engine r.p.m. 17,500. Estimated speed 92.5 m.p.h. 2:1 gears available. What size of tyres would be required?

(1) Set 17,500 r.p.m. opposite 92.5 m.p.h.

(2) Rotate wheel diameter disc *only* until gear index is at 2.

(3) Diameter index indicates a nominal wheel size of 3½ in.

In conclusion, I would say that if the reader is called upon to use his calculator for only one quarter of the problems I have been confronted with by various parties, he will find that the time and effort spent in making the calculator will be well worth while. Perhaps it will also ease my burden somewhat!



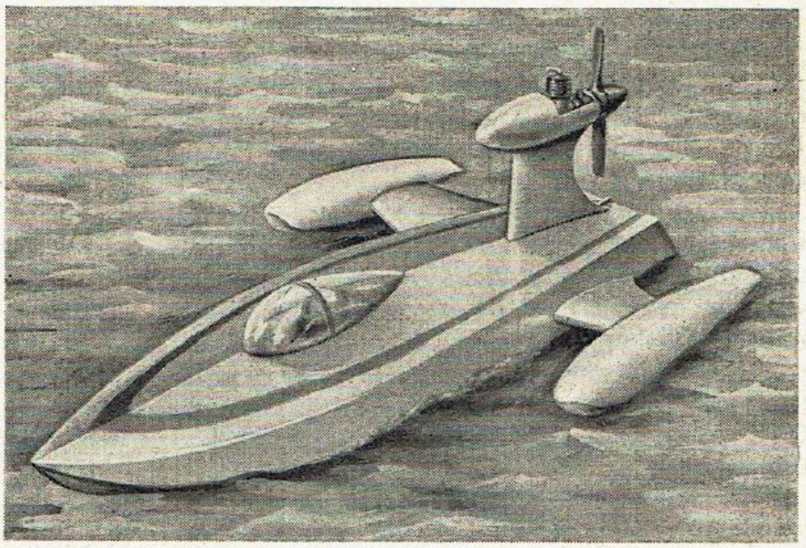
A 22 1/4" L.O.A. AIRSCREW DRIVEN HYDROPLANE FOR ·5 TO 1·5cc. ENGINES.
SCOOTER
DESIGNED BY
H. Daniels
COPYRIGHT OF
MODEL MAKER PLANS SERVICE
38, CLARENDON RD. WATFORD. HERTS
3/-
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
MM435.
ALLBON 'DART' SHOWN (USE A 6" DIA.X4" PITCH L.H. PROP).
SOFT BLOCK FAIRING.
1/4" PLY PYLON.
TILLER RACK.
16 S.W.G. WIRE TILLER & STOCK.
16 S.W.G. BRASS STERN TUBE.
18 S.W.G. BRASS RUDDER
FUEL TANK BUILT IN.
SAND TO SECTION.
3/16" PLY ENGINE BEARER.
MODIFY TO SUIT ENGINE.
TILLER RACK FROM SCRAP BRASS.
COMMERCIAL COCKPIT CANOPY.
1/8" X 1/2" SPINE.
B1
HARDWOOD BOW BLOCK
B2.
B3.
3/32" SHEET CRUTCH.
B4.
B5.
1/8" X 1/2" KEEL.
B6.
B7.
B8.
POSITION OF SPONSONS.
B9.
B10.
COVER HULL WITH 1/16" SHEET.
SLOT FOR PYLON.
A.
B.
C.
D.
SECTIONS OF SPONSONS
SOFT BLOCK TRANSOM.
TANK.
BEARER.
PYLON.
SPINE.
CRUTCH.
CANOPY.
3/16" PLY SPONSON STRUT. IN ONE PIECE
SAND TO SECTION
CARVE SPONSONS FROM SOFT BLOCK BALSA. (LEAVE SOLID).
B11.
BULKHEADS
B1 TO B11 FROM 3/32" SHEET.
FRONT VIEW
HALF FULL SIZE

HAVE FUN WITH

SCOOTER

AIRSCREW-DRIVEN HYDROPLANE FOR ·5-1·5 c.c.

By H. DANIELS



FOR those with access to stretches of water away from inquisitive-fingered crowds and regulations requiring silencing, etc., there is no doubt that an airscrew-driven hydroplane offers most fun per hour's building time. Naturally, as with any of the more exciting pursuits, reasonable care and consideration for other people is called for—the echoes of one famous case involving the demise of a duck still resound, and you won't win friends and influence people by getting *all* model boating stopped on a pond which a moment's thought would have shown to be unsuitable for this particular type of "aqutivity".

Having delivered the homily, let's get down to the model. *Scooter* is a Continental design published here by courtesy of "Modell Technik und Hobby", and is a good, sound, logical approach to hydroplane design with some particularly bright constructional touches. Positioning the outrigged sponsons at the stern makes a lot of sense, since it is here that most buoyancy is needed and also the corrective effect of the sponsons on lateral movements is in the plane in which lateral destabilising forces will arise. The layout offers the slight disadvantage that a pusher propeller is needed for the average rotary inlet model engine, but such props are now available at model shops or can be made by softening a plastic prop and twisting in reverse pitch. For a sideport motor, such as the Mills, a normal prop back to front will do, the motor being run "backwards". Alternatively, the height of the pylon can be raised slightly and a tractor airscrew fitted by mounting the motor at the fore end of the nacelle.

Construction commences with cutting the 1/32 in. crutch and bulkheads. Lay the crutch on the building board and cement in place the lower portions of the bulkheads; note that the sponson strut must be assembled to B9 and B10 before these are finally positioned. Trace and cut out the two-piece ⅛ in. keel and drop in place in the slots provided. When thoroughly dry, turn over and cement in place the top bulwark parts plus the spine and ¼ in. ply pylon. Sand lightly all over before sheeting with 1/16 in. balsa. Add bow and stern blocks, rudder tube, sponsons, tank, engine bearer, and fairing blocks, and sand to finished surface.

It is advisable to dope tissue (lightweight Modelspan or rag tissue) over the entire structure, followed by several coats of sanding sealer and colour dope to choice. Fuel proofer round the engine area is desirable for long life; banana oil will protect against diesel fuels.

KEN PROCTER'S

CALCULATOR

FOR MODEL RACING CAR DESIGN

It is now some time since my combined chart for estimating model racing car performance made its appearance in the pages of MODEL MAKER, and the calculator which I now describe may be regarded as a logical development from this.

The calculator is, to the best of my knowledge, original, and I think its greatest advantage over the chart is that, once fed with the necessary data, it records the results until a further calculation is made, whereas, using a chart, the movements from parameter to parameter do not leave a trace (unless some Goth is using a pencil!) and having reached the result only the virgin chart remains!

This deficiency could, of course, be rectified by the provision of suitable transparent tracers to cover the horizontal and vertical movements, but I feel that the calculator offers the best solution to the problem.

The finished size is four inches diameter, and it is therefore in the "Pocket" category and eminently suitable for use at the trackside. It is constructed from cardboard for simplicity, but of course, craftsmen can use plastic or other sheet materials as desired. In the past many calculators have been made in which the axis has been a two-legged brass paper clip, this design is very weak since, after a very small number of operations, the cardboard wears around the clip and the disc rotates in anything but a concentric fashion, resulting in most inaccurate results.

I have avoided such a weakness by providing a much larger "Bearing" surface for the axis in the shape of cardboard discs of $1\frac{1}{8}$ in. diameter for both the rotating discs and I can vouch for the fact that this method is highly successful.

The accompanying drawing shows the component parts and the recommended thickness of each, the reader having the option of either cutting the page and pasting the printed discs on the appropriate card thickness or enlarging each disc and transferring to glossy-faced Bristol-board which is to be preferred.

In making my own calculator, I drew the scales directly on Bristol-board and I would respectfully point out that the slightest deviation from the scales as published can have an adverse effect on the accuracy of the calculator.

Construction is almost self-explanatory, and should be tackled as follows:—

(1) Cut out the Base Disc.

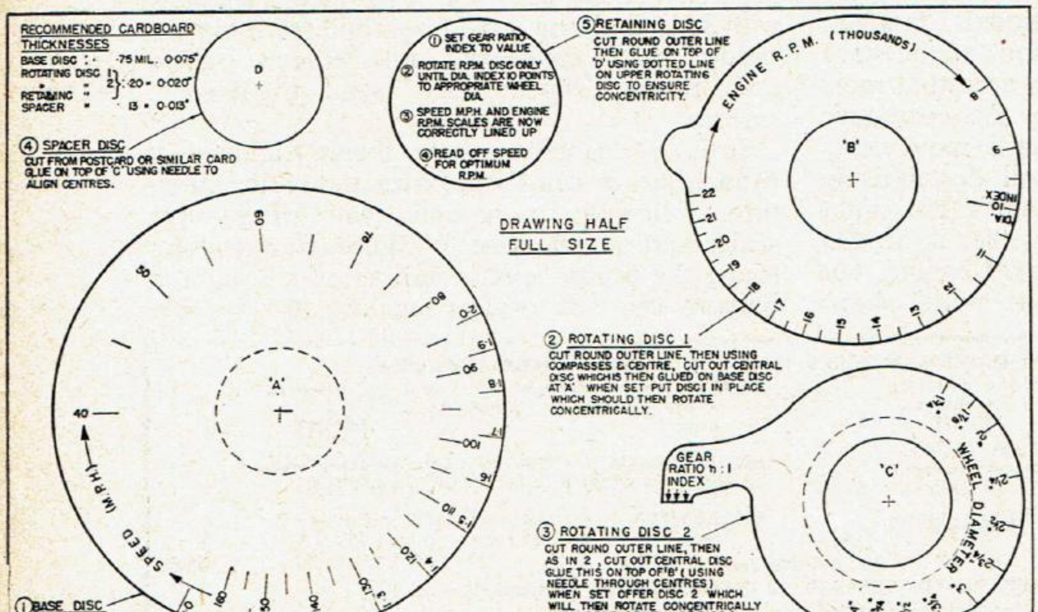
(2) Cut out the lower Rotating Disc (No. 1) then use a pair of compasses with the pen in closed position to deeply scribe the centre disc from both sides, and if necessary, use a pointed Balsa Wood tool to complete cutting-out operation. The edges of the central disc can be treated with graphite from a soft pencil prior to gluing on the base disc. A needle through the respective centres will ensure alignment.

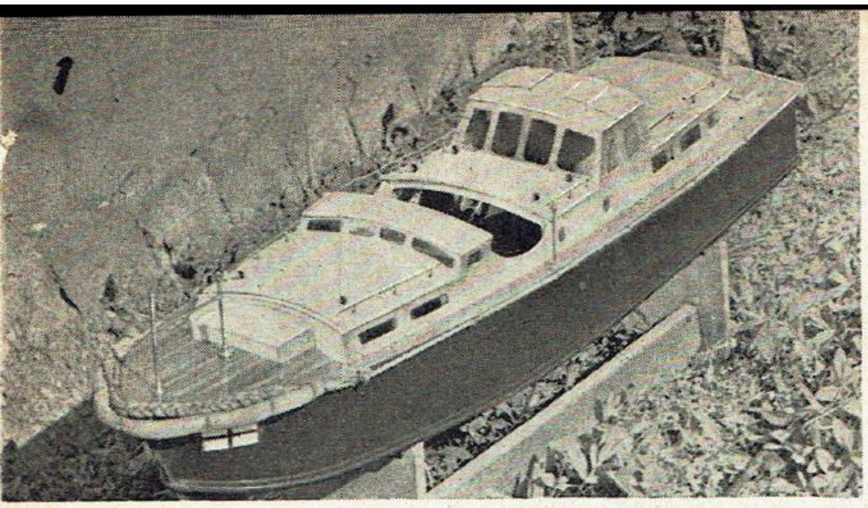
(3) Carry out similar drill with the second Rotating Disc.

(4) Cut out spacer disc and glue on top of central "axis".

(5) When glue is set centralising needle should be withdrawn and the two rotating discs put in correct order on

(continued on page 349)

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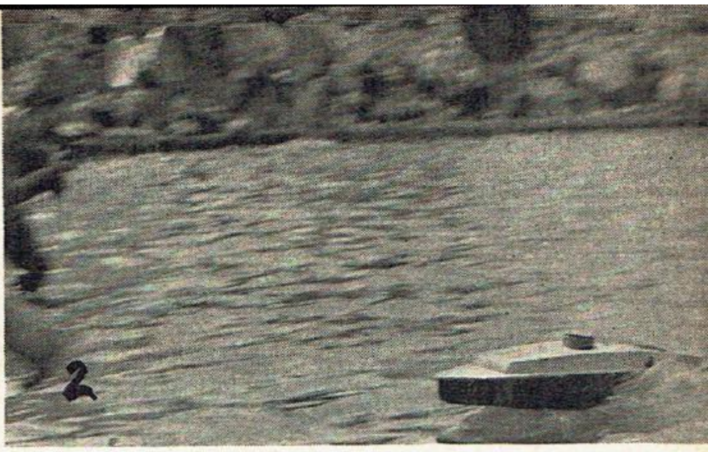
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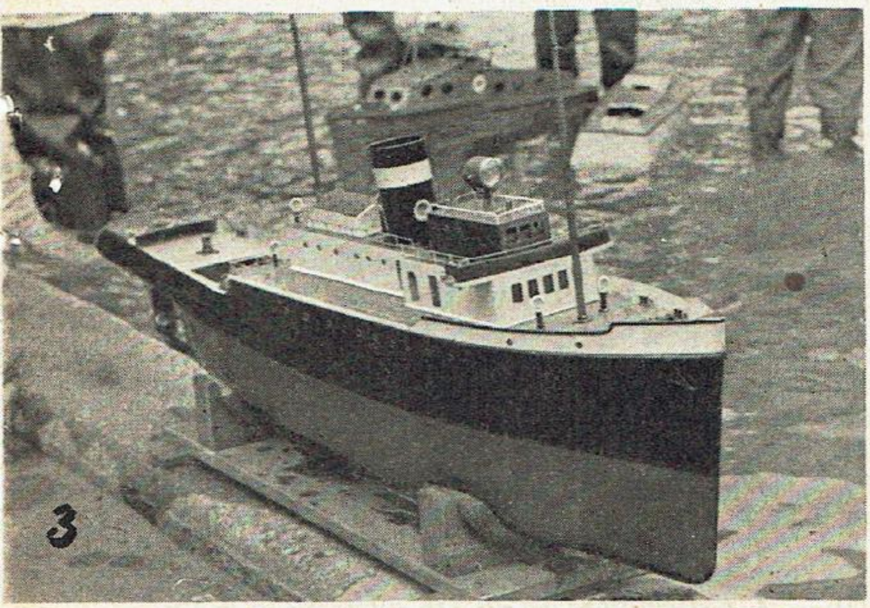
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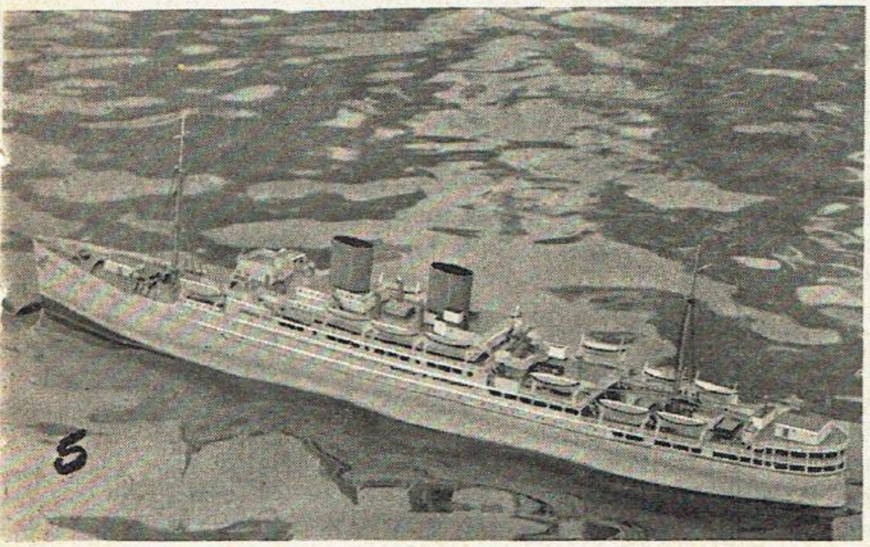
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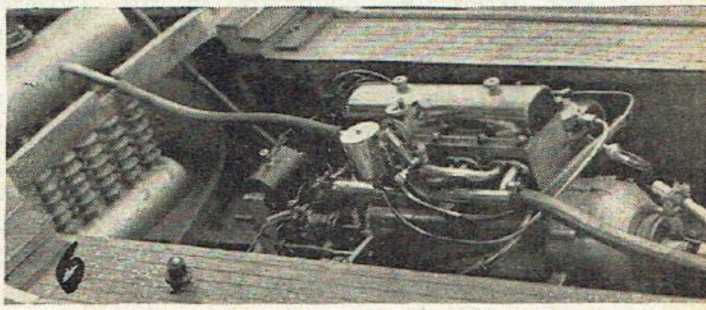
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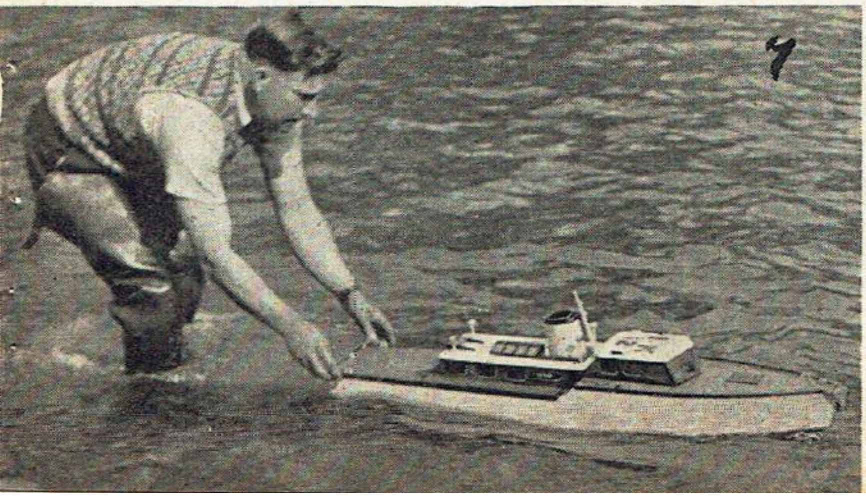
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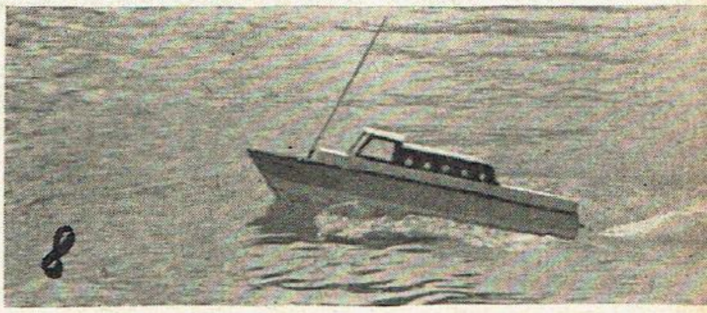
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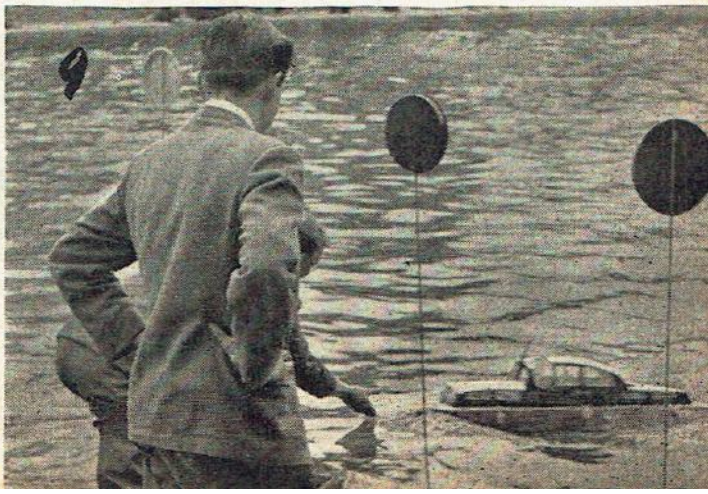
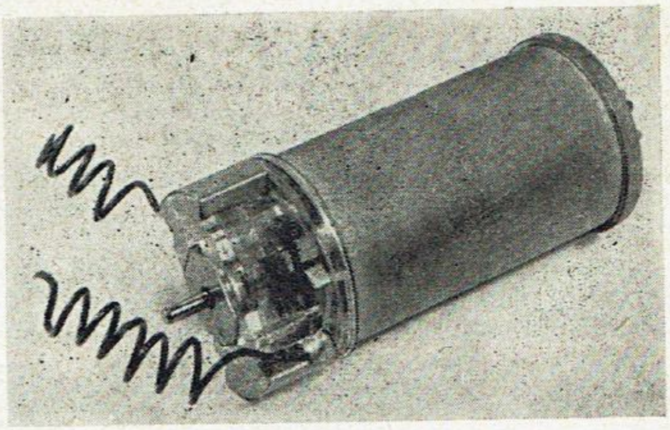

9

MODEL MAKER MOTOR TEST

The German Distler

BY R. H. WARRING & E. J. HOOK



THE *Distler* is a most remarkable motor, reversing the usual disposition of field and armature by having the permanent magnet *inside* the armature, with the latter revolving around it and with a high resistance armature winding giving a phenomenally low current consumption. The *stall* current of the Distler, in fact, is less than the minimum of free running current consumed by most other permanent magnet motors of comparable size.

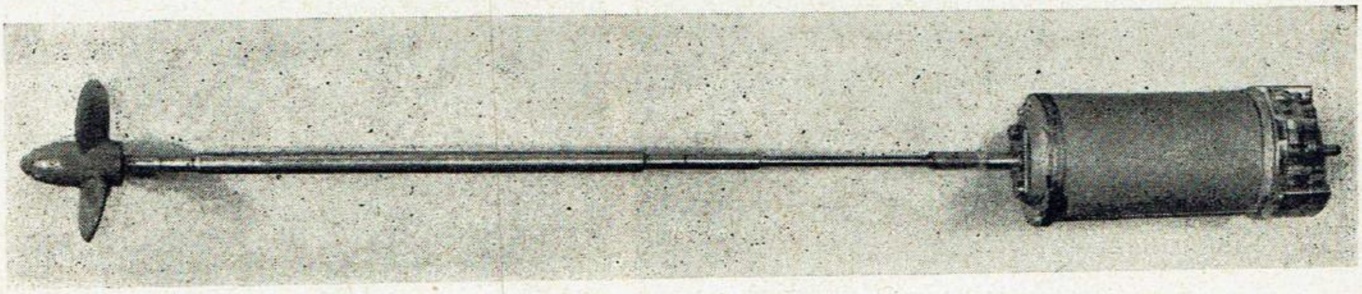
Since, in such motors, torque is substantially proportional to armature current times motor efficiency, the actual power output is on the low side, the peak figure being nearly .00018 B.H.P. at 2,500 r.p.m. However, at this point the efficiency of the *Distler* is roughly twice that of most comparable motors and the maximum efficiency approaching 60 per cent. is the highest yet recorded on any model motor. In other words the price you pay for lower current consumption is a lower power output, but you get about half of that back on account of the very high efficiency of the *Distler*. Quite a remarkable achievement in a moderately-priced unit.

The *Distler* is also remarkably smooth running. The actual design voltage is not known but since the unit is employed on a number of battery-powered models utilising a 4.5 volt supply all tests were conducted on a constant 4.0 volts. Free running speed on 4 volts was measured at 3,650 r.p.m., the motor consuming 14 milliamps. Performance appears to be identical with either direction of rotation, spot checks with similar loads showing agreement of both speed and current consumption within 5 per cent. with exact duplication with some loads.

The *Distler* cannot be taken apart to view the "innards" without permanently damaging it. The armature and field units are housed in a cylindrical steel case fitted with a die-cast zinc alloy end plate at one end and a transparent moulding, which carries the brush gear, at the other. The end fittings are tagged in place, which tags can only be freed by grinding or filing off. But even if the metal end cover is removed it will still be found impossible to withdraw the armature, so you are still little wiser as to the construction !

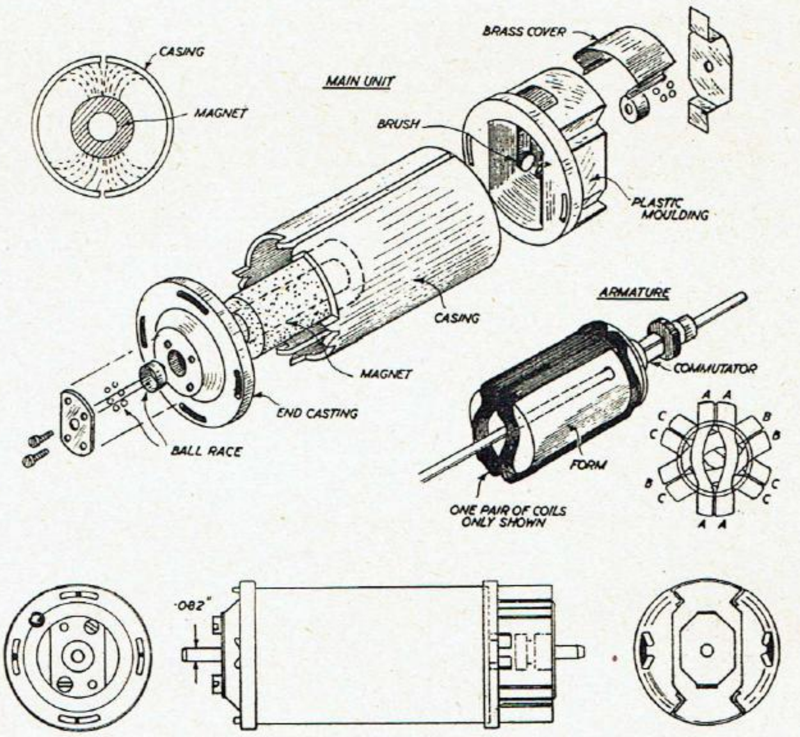
Constructional details are summarised in the sketches. The die cast end cover is formed with a long spigot on which is moulded, pressed or bonded a ceramic permanent magnet of cylindrical shape. A generous clearance hole is drilled through this spigot to pass the armature spindle, this being supported at both ends by elementary ball races and thus otherwise free from frictional contact along its length.

Fitted to the armature spindle is a plastic moulding which is a form for the armature windings. There are six of the latter arranged in three pairs, each coil of a pair being connected in series. These pairs of coils are wound external to the armature form to the required shape and then pressed in place, the final pairs being spaced at 120 (geometric)



degrees. The whole assembly is then bound with a length of thin plastic sleeving (which may be of the type which is heat-shrunk on), thus holding the windings securely on the form. This has to be done with the armature spindle mounted through the end plate for the ends of the coils surround the cover end of the permanent magnet, hence once the coils are added to the armature form the two units cannot be separated again unless the coils are bent open. Armature resistance is 25 ohms.

The purpose of the outer casing (apart from hiding details of the interior, if this was intended) is to provide a return magnetic circuit for the field magnet. Technically this feature is poor since the cylindrical casing is in two pieces with an air gap between, when assembled, this presumably being done in the interest of production economy. The casing, incidentally, is of quite thick steel (1.5 mm.).

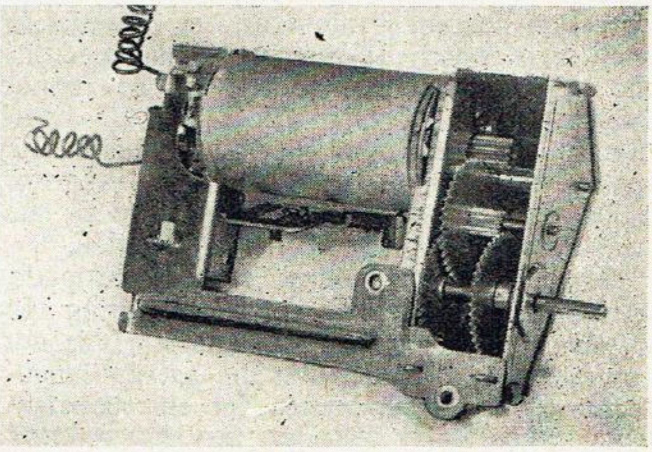


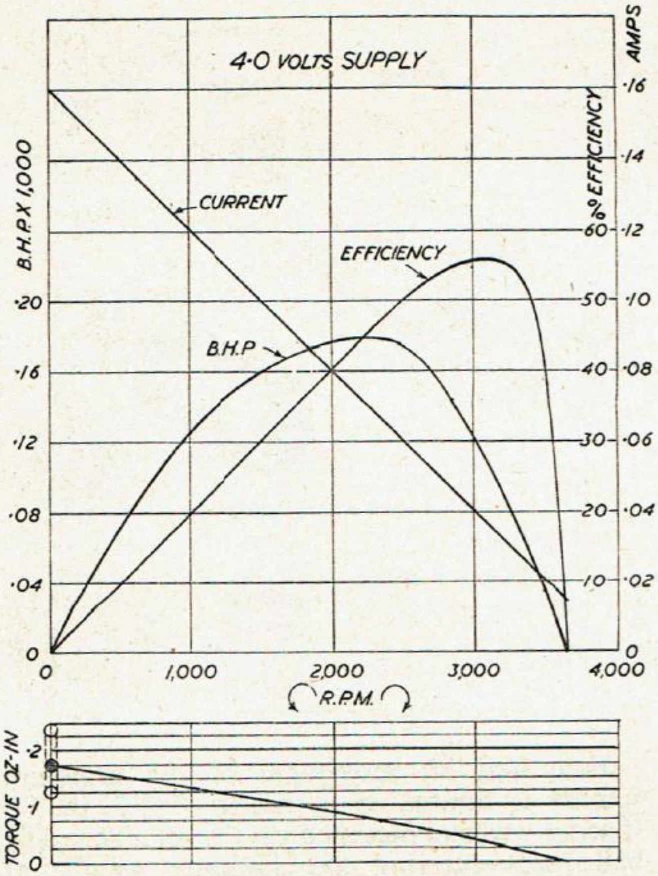
The permanent magnet appears to have been moulded or cast from one of the modern ceramic materials and is very weak with the two poles rather diffused. Its efficiency as a field magnet is undoubtedly reliant on the outer casing as a "return field" path. An interesting technical point here is that the armature has no iron in it and has thus no radial loads imposed on it should there be any lack of concentricity of the armature relative to the field, or should the field poles not be accurately diametrically opposed. With no iron, too, losses in the armature are lower, a contributing factor to higher efficiency.

By contrast the commutator end of the motor is more or less conventional. The clear plastic moulding incorporates the rear ball race housing and the brush holders. The brushes are small copper carbon discs soldered to brass leaf springs and bear against a three-segment copper commutator of small diameter. The brushes are held in place by brass cover plates which can be slipped off if necessary. Connection to the brushes is made by soldering leads directly to these cover plates.

Heading photograph shows the basic Distler motor; that on left is of the shaft and cast screw marketed by the manufacturers for this unit. Right is the Distler car gear box; the "gear shift" can be seen immediately below the barrel of the motor, and by movement of the righthand gears gives one reverse speed of 1-40, one neutral, and two forward speeds of 1-22 and 1-12. The unit can also be used as an escapement mechanism for a boat, the varying gears being used to alter speed of rudder action for different conditions

Fore and aft movement of the armature spindle is limited to a matter of 1/32 in. by spacing washers mounted on the spindle. The ball races carrying the armature spindle at each end are of an elementary type consisting of a thin steel cup pressed into each end cover, drilled with an oversize hole to pass the spindle. The space between the spindle and the inner face of the cup, i.e. the outer raceway, is then filled with six .078 in. (2 mm.) diameter steel balls which are then retained by the fitting of a steel cover plate. The plate is mounted with tags through the plastic at the commutator end and with small brass screws at the other end. The bearings are by no means a "precision" fit but certainly appear to have low friction properties at all running speeds.





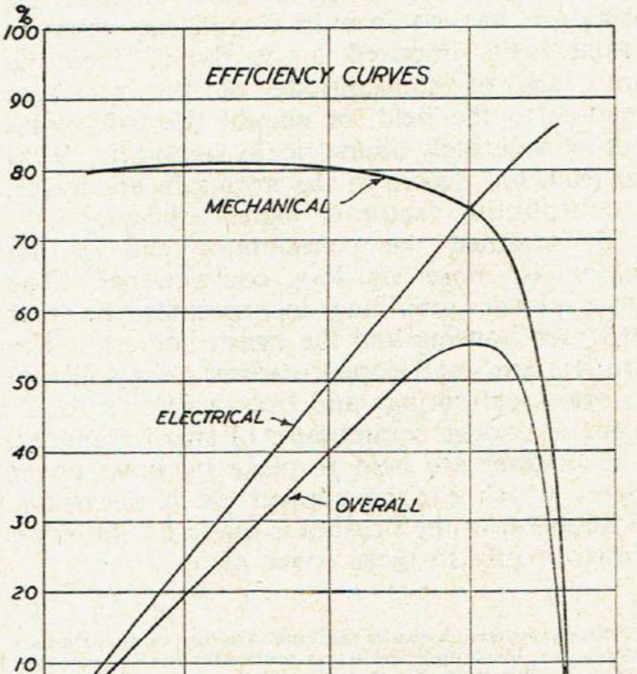
Losses between output and driving power are therefore very low. These losses, which affect the overall and mechanical efficiency of a motor, are comprised of iron and frictional losses. With no iron losses and low friction the mechanical efficiency is therefore very high (around 80 per cent.) which with an electrical efficiency directly comparable with other permanent magnet motors accounts for the favourable overall efficiency figures obtained.

In terms of useful application, the torque is rather too low throughout the useful speed range for a good many applications in which motors of this size are employed. Hence reduction gearing is more or less essential in such cases when the best operating speed for the motor would appear to be about 3,000 r.p.m. At this speed, on 4.0 volts, current consumption is only 40 milliamps and overall efficiency 56 per cent. The range of 2,000 to 3,000 r.p.m. would appear to be the best operating speeds in any application.

Because of its modest current demands, exceptional battery life is possible using the *Distler* in any practical installation. It is not commonly appreciated that the battery manufacturers' recommendations for current drain from standard dry cells are very much lower than the currents frequently taken from such batteries. In other words, batteries are commonly operated at discharge rates well above that for which they were designed with consequent rapid polarisation and loss of performance. A U.2 battery, for instance, is normally rated for 25-100 milliamp drain; a U.11 for 20-60 milliamp drain.

These figures are within the demands of the *Distler* and so not only do you gain more from your battery in the form of a higher motor efficiency but the battery itself has a higher effective capacity, and therefore longer life.

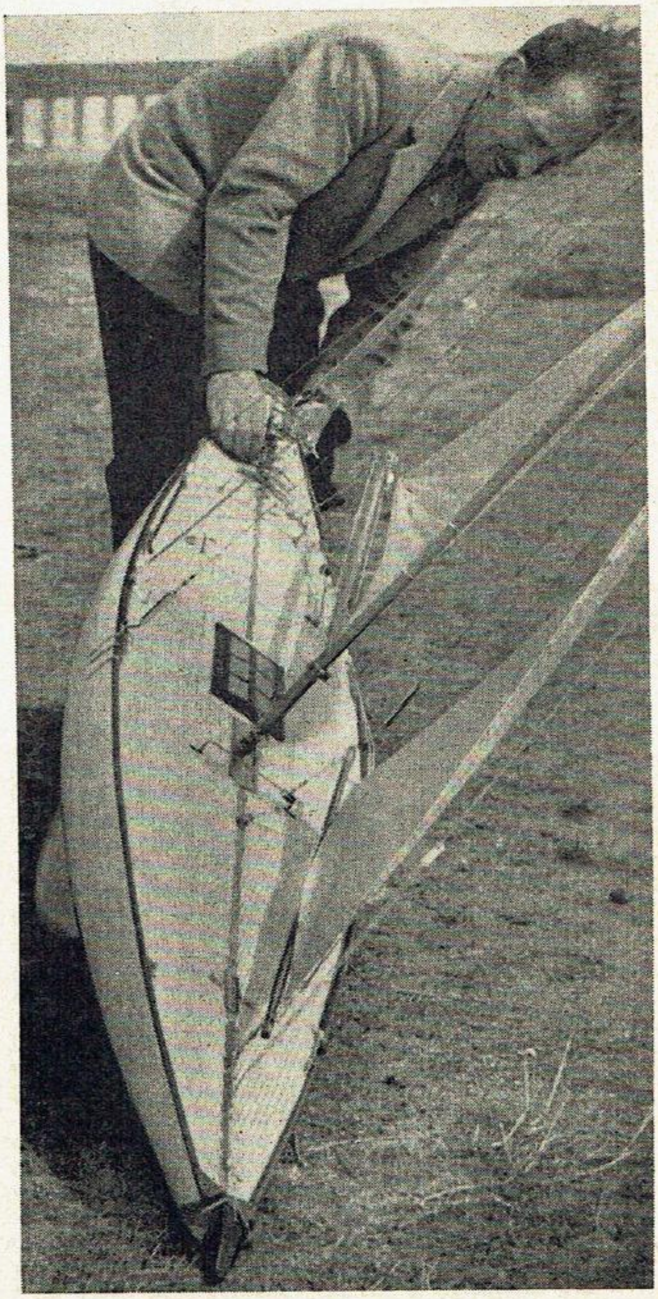
Whilst the use of a field magnet inside a rotating armature is not unique—this arrangement is uncommonly like that of a modern meter movements—this is certainly the first of the standard model motors of this type and as such represents a definite technical advance on contemporary designs. Compared with model standards, however, it is a relatively costly production and whether or not part of this cost is recovered against an industrial contract is not known. Certainly its retail price in the model trade is lower than one would expect for a job of this nature, and quite obviously a lot of original thinking and development work has preceded its production. And for those who may be contemplating its possibilities for radio-control work its weight is 2 7/16 ounces.



STARTING ON THE RIGHT TACK

PART FOUR—TUNING UP

BY D. A. MACDONALD



THE amount of time and effort involved in tuning up a yacht for maximum performance varies very considerably. Some boats reach their peak performance after a few hours of sailing time—others are still not giving of their best even after a season's racing. The time taken depends mainly on two factors. One is the amount of care taken on the design and construction—obviously a boat which has faults will take longer to sort out than one which is free of vices. The efficiency of sails and gear enter into this to a large extent. The second important factor is the way in which the tuning-up process is carried out. If this is done systematically and logically it will obviously produce better results in a given time than will haphazard sailing and random guesswork. The final stages of tuning-up will involve the skipper as much as the yacht, because however perfect a craft may be, the skipper must know its behaviour well enough to be sure exactly what effects will result from any change of trim under any kind of sailing conditions.

The novice who has just completed a new boat is sure to be anxious to get it on the water as quickly as possible. This urge must be restrained. Before the boat leaves the dockyard it must be checked over most carefully. The action of all the gear must be checked and all sails set up, so as to ensure that all suits and spinnakers can be used to best advantage when required. The boat should be tested in a tank, fully rigged to ensure that it floats on the correct L.W.L. It should not be sailed until the skipper is certain on this point. It should also be put through the process of measuring for conformity with the rating rules. If in any doubt, the owner should call in the club measurer, or other competent person to assist. Many yachts are launched and laboriously tuned up before being submitted for measurement, with the result that if they are found out of rating and have to be altered the whole or at least part of the tuning process has to be done again. Alterations and possibly re-measurement may, of course, have to be done if the tuning-up process reveals the need for such changes, but an extra measuring operation takes far less time than a repetition of the tuning up process. Therefore, the practice of measuring first is a valuable insurance.

Assuming the new craft has passed all its "dry-land" tests, she may now be launched on her home water. Most textbooks advise the skipper to choose a warm dry day with a moderate breeze. Unfortunately, in our variable and unpredictable climate, this might mean a very long delay for the man who has other calls on his time, so in practice it is usually a case of making the best of what conditions are available and using each opportunity of sailing to the best effect. Yachts with cloth sails should, however, not be sailed in wet (even damp) or very windy weather until the sails have been fully stretched out. Until the sails are fully stretched the yacht will not trim or handle correctly to windward, so it should be remembered that the later stages of tuning "on the wind" should not be attempted until the sails have attained their correct form. The method of stretching new sails is as follows:

(1) Ensure that all standing rigging is correctly set up and perfectly taut.

(2) Set the jib. Halliard and clew outhaul should be set gently so that there is a minimum of strain on the sail. If there is a jib kicking strap, this should be set so that some rise of the boom is allowed.

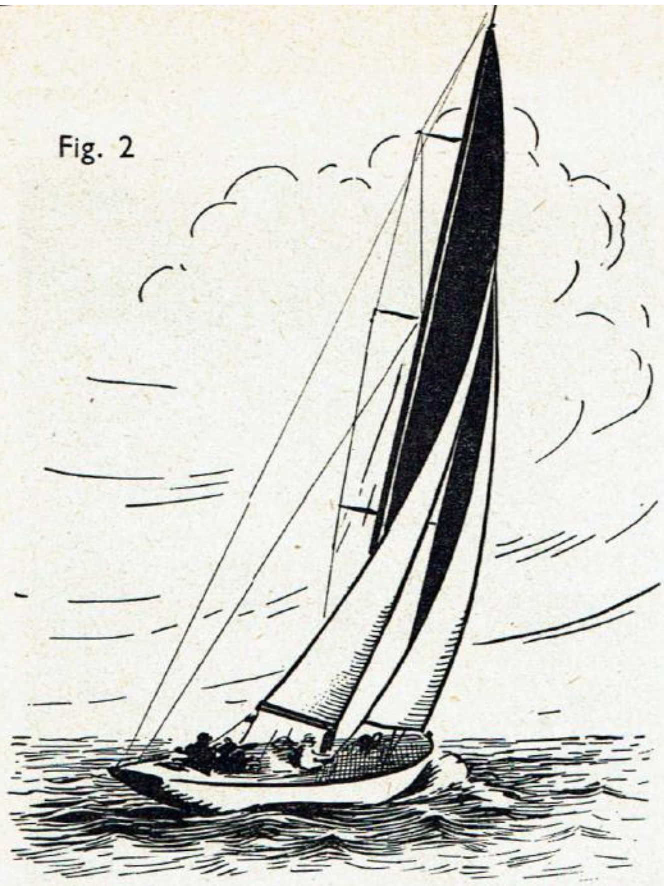
(3) Set the mainsail. The luff should not be hooked to a jack stay. The halliard is set so that the luff is only gently taut, and the same applies to the outhaul. The kicking strap should also be fairly slack.

(4) A spiral cord lacing should be used on the luff, but left sufficiently slack so that the sail is not pulled in to the mast but allowed to retain the hollow in the luff which it naturally assumes when set up as in (3) above.

(5) The yacht is sailed on one or two boards close-hauled, and trimmed to sail full full-and-bye, not too high in the wind.

(6) It will soon be found that the main halliard can be tightened. When this is done it will be seen that the hollow gap between mast and luff is

Fig. 2



reduced, and the slack in the lacing can be taken up, but without pulling the luff out of its natural curve. The jib halliard can also be taken up slightly and the outhauls adjusted as necessary.

(7) The yacht is again sailed for a time, as in para. (5), and the process of para. (6) repeated.

(8) When the sail is fully stretched, the mainsail luff will lie naturally snug to the mast, and it can then be hooked to its jackstay without developing creases. The jib will have lost any slight creases which appeared when first set up.

(9) It is likely that on a second outing the sails will have tended to shrink back slightly, and the lacing may have to be used again, until the sail has permanently acquired its final shape.

The first and most important step in the tuning-up process is to establish the mast position. In the past this has often been a difficult process and, in fact, many yachts had to make considerable use of the adjustable mast arrangements to allow alteration of position and rake for various sailing conditions. Better hull balance and the assistance given by vane steering gears have made the mast position less critical, but it is none the less necessary to find the optimum position for windward sailing in order to derive the maximum efficiency from sails and steering gear. To determine mast position the yacht should be sailed close-hauled, and I recommend that the position be established by sailing on a light breeze, and checked again when sailing close-hauled in a fresh to strong wind.

For the first test the mast should be set up in the designed position, with the amount of rake indicated on the design. The standing rigging should be really taut, with particular attention to the jib stay, and the mast should be dead straight, with no tendency to lean to either side. Assuming we have a slight breeze, the jib and main sheets should be set so that the boom angles are in the theoretically correct position for sailing close to the wind. Assuming the yacht is fitted out in accordance with the previous articles in this series, this means that the sheets are set so the boom lies just outside the ends of the horses, the jib being a shade freer than the main. To set the main kicking strap, pull the boom down until the leach of the sail is quite taut, and then allow the boom to rise until the clew of the sail lifts by about $\frac{1}{8}$ in. for every 10 in. of length on the foot. With the yacht held in an upright position, and pointing so that the wind strikes normally on the sails, set the jib kicking strap (if fitted) or adjust the position of the deck hook on the jib boom, so that the leach of the jib, when viewed from astern, forms a curve parallel with the leach of the mainsail. The rig now consists of two airfoils, virtually parallel in both horizontal and vertical planes, giving a gap or slot of uniform width along its length. The clew outhauls should be adjusted to provide a slight camber (or flow) at the foot of the sail.

In Fig. I we see an experienced skipper carrying out this operation of trimming for windward sailing. Note how the yacht is held in the wind—as nearly as possible as if it were sailing, and the skipper sights along the sails from astern, making sure that the sails are in fact lying in parallel curved planes. Note also that the angle of the booms are set in relation to the horses in accordance with the instruction given above, and observe the slight camber imparted to the foot of the mainsail, by adjusting the outhaul. Fig. II shows a nicely trimmed yacht sailing in a very light breeze—the lift of the main and jib booms is perhaps rather more than advised above, but this serves to accentuate my point about the parallel curves on the leach of both main and jib. It is worth considerable care to get this sail trim just right, and a waste of time trying to get the best out of a boat until such a trim can be achieved.

When the skipper is completely satisfied that the sail trim is correct in every respect for maximum efficiency, the vane steering linkage pin should be removed and the tiller locked central. A very taut tension on the centring line could be used for this purpose, but it must effectively prevent any tendency for the rudder to rise or fall when the yacht is heeled. The vane rotor should be set in line with the linkage arm with the feather aft. The vane gear will now take up something like its normal position when sailing, but will not actuate the tiller. The yacht should now be put off, full-and-bye, with a slight imparted way, into a light breeze, and its behaviour noticed very carefully. Normally it will do either of two things:

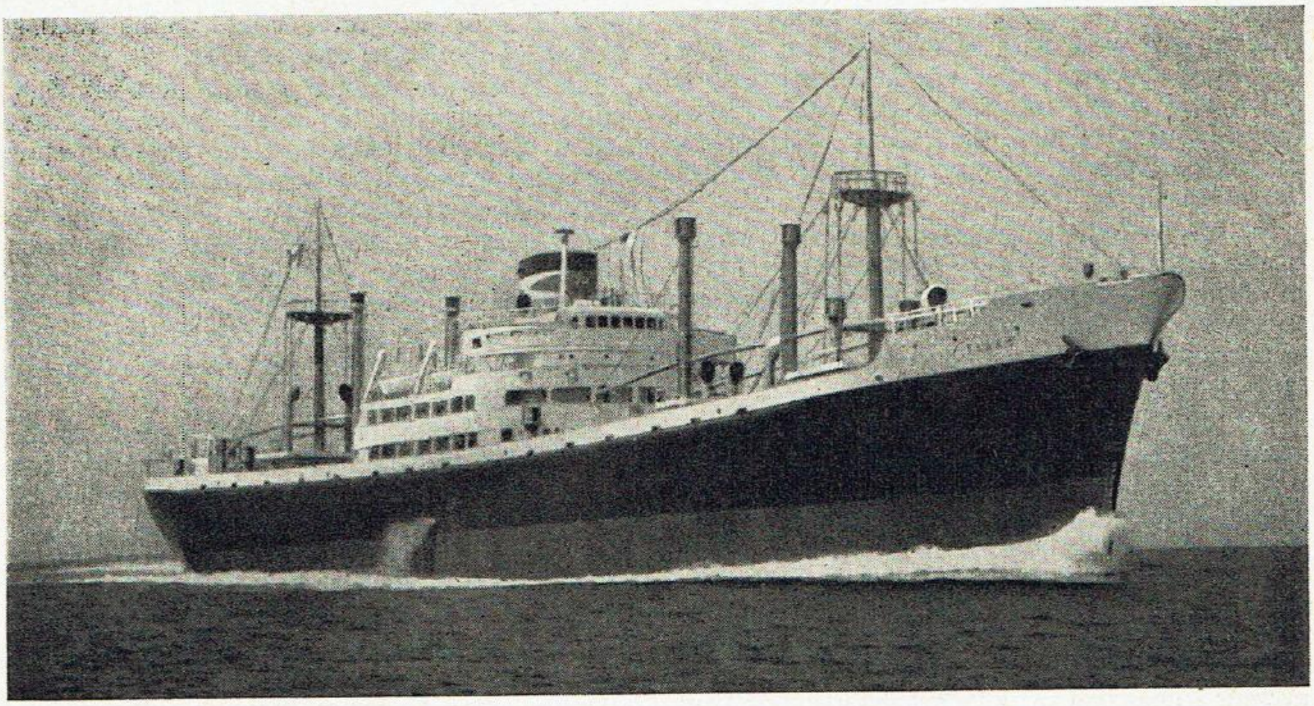
(1) It may continue to sail full-and-bye, but slowly falling off the wind until its course becomes something more like a reach.

(2) It may turn up slowly into the wind, until the jib spills wind and shakes, whereupon the boat goes "into irons".

Whichever happens, the boat should be taken back to the starting point and the process repeated, but sailing on the other tack. The yacht should exactly repeat its previous performance. If it does not (*e.g.*, turns into the wind on one tack and falls off on the other) the yacht is out of lines in some respect, and the rudder should be checked and re-aligned as necessary until the boat behaves (as near as can be judged at this stage) in the same way on both tacks. It is worth repeating these tests a number of times, to be absolutely sure that the behaviour is identical on both tacks, and no further operations should be attempted until this condition is achieved.

If the yacht is found to have a general inclination to fall away, and not point up to the wind when correctly trimmed, the mast should be moved aft. If on the other hand the boat goes into irons, or sails so close to the wind that the sails continually spill wind, the mast should be moved forward. The amount of movement required depends on how seriously the yacht is off course and also, of course, on the length of the yacht

(*Continued on page* 371)



M. V. TARANAKI

PART TWO OF A SERIES COVERING CONSTRUCTION OF BOTH MODEL AND MACHINERY

BY " TARENTFORD "

DESPITE the apparent complexity of the centre island assembly, there is nothing really formidable in the construction when the section is broken down into a number of comparatively simple operations.

The bread and butter principle is utilised for this member, and each deck is cut from a suitable thickness of timber. The centre is hollowed to reduce weight and to allow the uptakes to pass through, and at one or two points just below the wheel-house top, the inside is chiselled away to clear the sloping trunk, an operation which is best left until the boiler and island are first assembled in place and just prior to a water test.

The actual decks are thin pieces of aluminium sheet, bent to form " trays," and when completed they are arranged between the wood blocks as the sketch on the drawing illustrates. Long thin wood screws can then pass down and hold each piece securely.

Cut as much of the inside of these blocks away as possible—weight so high up is obviously not advisable on a ship of this type —you can thus thin the walls to about 5/16ths in. except where woodscrews are situated. and this gives a reasonably light centre island. Though aluminium is specified for these "trays," thin copper or even steel sheet will do if nothing else is available, because again the centre is relieved to clear the trunking, so not much remains to create excessive weight.

This island is supported on aluminium bars set across the hull—the thickness of the latter is sufficient to allow you to cut pockets to locate these details, and you can screw them as an additional safeguard against dropping one into the pond when getting up steam. Small projections attached to the island locate against these bars, and so position it accurately and without further fixing—a clearance of a few thousandths of an inch is enough to make the section easy to lift off and not too great to allow it to move while under way.

In the previous article it was mentioned that the funnel was not circular but resembled a pear in plan. In order to secure an excellent-looking stack, the reader is well advised to make a simple wood former round which he can roll his material. Remember this is one of those items which catches the eye of every pond-side observer, and as they have opportunities to take a bird's-eye view of things, a poor shape is very critically noticed. It does not take long to cut a suitable former to the inside dimensions—simply square off a piece of timber and mark out the profile on one end. Saw away the surplus and file the outline carefully. The author is well aware some readers will view with horror the use of files on wood articles, but a big 14 in. member is not a tool which one can despise and is ideal for roughing down the shape to almost correct dimensions. A sanding process restores the surface.

At the bottom of the stack there is a small angle running all round—this you can make in three or four sections and butting them together. We shall deal with such fittings as sirens and the other near top deck details in a later article.

Aft of the funnel there are two mushroom vents, and as described last month, one of these is used as a steam valve control. The top simply becomes a wheel, and if you knurl the diameter carefully and then fill it with paint, it gives enough grip to allow you to rotate the valve spindle yet the knurling does not show unless very close observation is made. Hole boring for such a long valve spindle may present some readers with a problem, but they can drill it somewhat larger and use the vent tube as an upper bearing. Incidentally, you could cut away the wood round this spindle if care was exercised when setting the valve position—it does not matter where this item is attached; either port or starboard side is suitable, so see that the rather long control spindle has plenty of clearance and that it has no opportunity to rub against the wood of the centre island. The control valve cum mushroom is detachable to permit you to lift off the island without having to resort to spanners or screwdrivers—a close push fit on a square shaft is sufficient.

Incidentally, while on this matter of the centre island, here is another photograph of a prototype—probably taken on her trials, and the three-quarter view shows the bridge details rather well. This vessel is the M.V. *Tideo*, identical, as a comparison will show, to the ship illustrated in the previous issue, and both photographs used in conjunction with the prints should enable readers to find all the detail they require.

For those who prefer a more detailed ship, hatch beams with the usual wooden planks add a touch of realism to the model. How these are arranged is depicted at Fig. 1, but frankly these items are, in the writer's opinion, a real nuisance in the forward holds where the tank filler is fitted. The hatch sides are easily bent from thin sheet material as this drawing indicates, and similar metal for the stays gives them sufficient realism to give the ship a finished appearance.

The steam plant will naturally need air for it to operate satisfactorily, and while you can leave off say the two forward covers when the vessel is under way, this is not good practice. You can fairly easily hide a louvre in the hatch side by cutting a slot and bending the metal upwards, and when constructing the doors which must appear at intervals in the island, one or two of these on the main deck, if left as holes, should ensure there is sufficient air supply to the burner. Again the forward hatches need not fit very closely—in fact a gap of about 1/32nd in. all round the hatch with just four points to locate the cover will allow some air to draw through at this point. The brief sketch at Fig. 1 indicates this method, and it has the advantage of being unseen by anyone not "in the know."

While dealing with the centre island design, this is an excellent opportunity to include a sketch or so on the way to construct the ladders which must appear at various intervals. Anyone attempting the making of these rather intricate parts must first produce a wooden jig—a simple affair as the next illustration at Fig. 2 illustrates, and it consists of a square block of wood—a hardwood for preference, because it stands up to the work and is less inclined to split. Slots are cut for the treads and rungs and a brief check with the height of each deck and fo'c'sle will tell how many each must have. Incidentally, rungs are for the latter ladders, and treads in all other cases. Cut the pins for the rungs a trifle shorter than the overall width—cut them roughly to length and file them to the desired dimension as the enlarged abbreviated sketch indicates, and this will allow you to leave a "blob" of solder at each end when you finally clean them up ready for painting.

The deck ladders require a similar jig, but this time the slots are cut at 60 degrees for the treads. Cut the treads to length and dress them off, not forgetting to very slightly radius the nose, as nothing looks worse than such details with razor-like edges. Tin each tread and complete a ladder while the assembly is still warm. When this operation is finished, add the rails as shown on these sketches and remember the wire passes down one side, under the lower tread or rung and up the other side to form the pair of rails—to join the deck rail at the top ball.

All this may appear rather an elaborate way to undertake the work, but once the jig is made—a matter of ten minutes cutting and filing, and with all the various pieces cut to the necessary lengths, it becomes an easy matter to assemble them with the aid of a small iron.

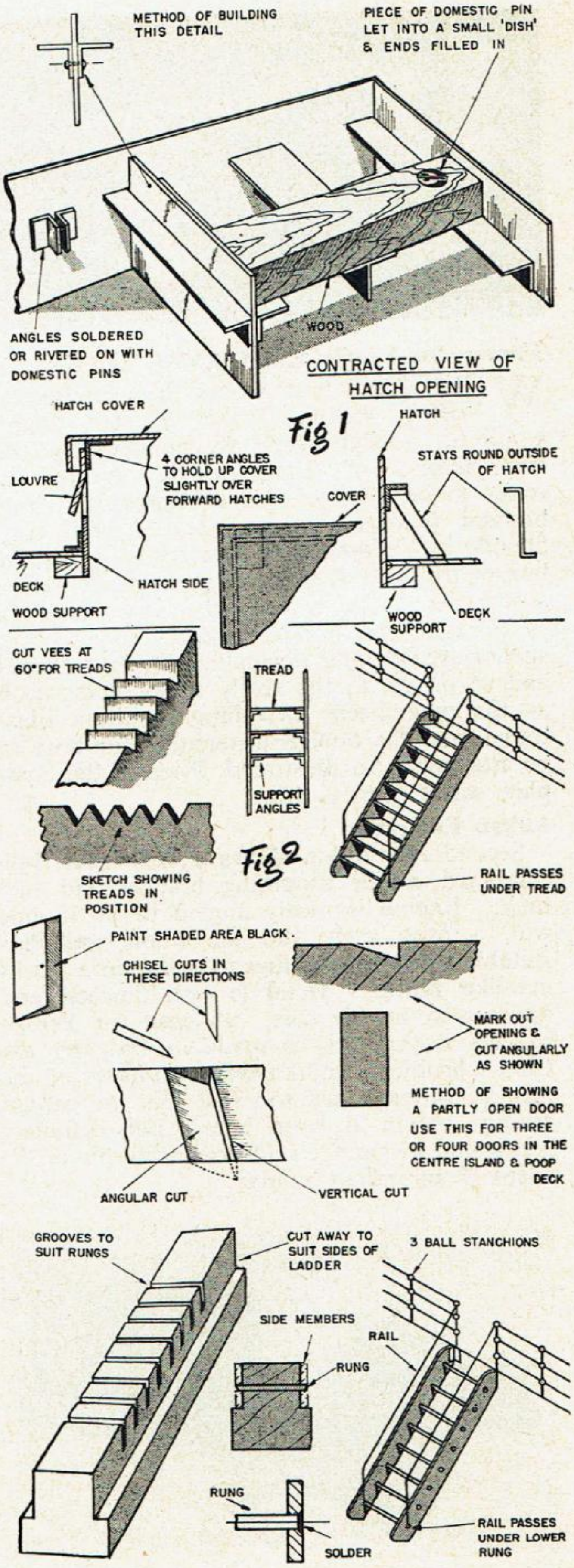
The Main Deck

The main deck is made up from either thin timber or sheet aluminium, but somehow the latter material never looks realistic despite the care lavished upon it when painting. On the main assembly drawing there is shown a suggested break in the deck length to enable the reader to make adjustments on the machinery; if an adequate ribbing underneath is introduced these sections should come away easily and will not distort through continued use. The writer prefers to make the centre island separate from the main decks as the extra weight in the centre can create distortion.

The forward sections can assume a semi-permanent characteristic, merely being removed when the ship returns home after a cruise. The centre island also need not really come off while at the pond side if you make a "getatable" filler plug say through the other mushrom vent, and this leaves only the aft portion which can lift away to allow oiling and adjustments to the burner to take place.

Never use new timber for decks, because if one corner starts to lift the easiest way to cure the problem is to smash up your effort and start again. Also do not have them too tightly fitting and keep them painted to prevent water causing them to swell at vital points—nothing is more exasperating than to try to tug a deck free from the mounting. *Taranaki* will not ship water—at least not in sufficient quantities for it to pour into the engine room, but in all this type of work a close fitting joint adds much to the appearance of the model.

The next article will interest those readers who have the necessary facilities for the manufacture of the steam plant; though enough information is given on the prints for this work, a few hints on the construction and installation are, no doubt, welcome.



TEST BENCH

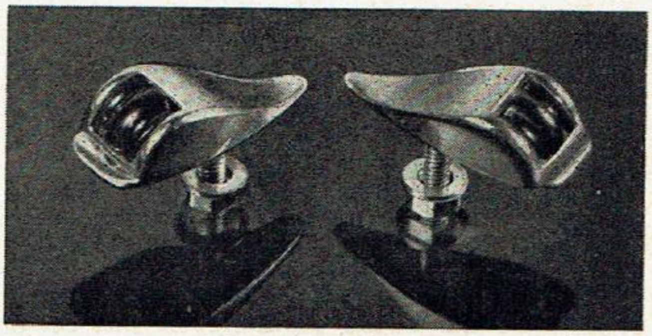
A REGULAR TRADE REVIEW

Luxury Launch Navigation Lights

Mersey Marine Models usually send us one-off examples of new fittings that they have in mind. The highly polished green and red navigation lights shown are some of their latest in this direction. Not to be confused with any "ordinary" fittings, these are chromium plated and ideal for use on a real luxury type model launch or cabin cruiser. Overall length is just over $\frac{3}{4}$ in.—or somewhat smaller than illustration.

Nameplate Service

Growing interest in a widening range of old time cars and even a few modern ones makes the Yeoman series of nameplates most appropriate. These are cast with an integral angled stand, and in this form are exempt from purchase tax. (For some reason if they are drilled for attachment to a model's base, they become liable! Well, well!) At the price of 1s. 6d. each they offer good value and add a professional finish to the model. Vauxhall is shown but there are a whole range of alternative names.

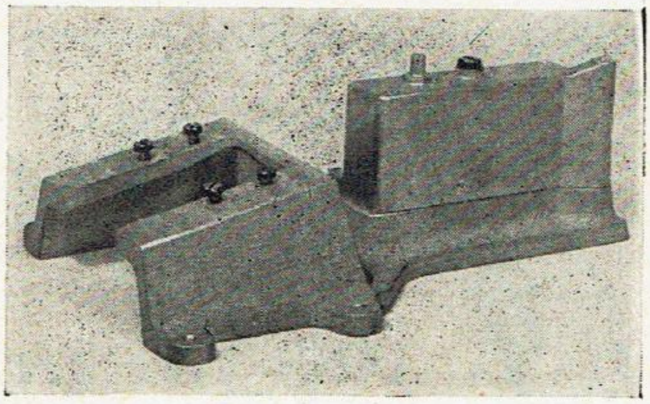


Fittings for Vosper R.A.F. Crash Tender

WHEN Aerokits produced their fascinating Vosper R.A.F. Crash Tender, many would-be builders were discouraged by the vast number of detail fittings required to really make a go of this fine model. These hesitant fellows can now step forward confidently as Yeoman have now added a suitable box of tricks to their growing range of marine accessories. The set includes every possible requirement cast in white metal, ranging from anchor, ventilators, navigation lights, bollards and so on up to the really tricky items such as the magnificent swivelling monitors illustrated, and the double watercocks for hose to be attached, also illustrated. Price of the complete set of parts is 42s.

Italian Enterprise

Second illustration shows a very neat little combined engine mounting bracket and fuel tank. Engine is nicely angled to be in line with a prop shaft and the whole unit has suitable bolting down lugs to make up a workmanlike fitting. Metal is well finished and appears to be die cast. A snag for British readers is that this is made in Italy by the Clerici brothers, well-known proprietors of the firm of Movo. Just too bad that we cannot readily obtain it over here — but definitely something to put the odd liras aside for in the event of an Italian holiday.

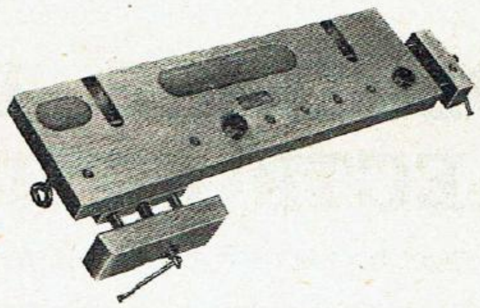


Plastic Props

Yeoman are now doing some new plastic props that should interest boat modellers. Of $1\frac{1}{2}$ in. diameter, they have brass bushes, suitably B.A. threaded, and are available as either two or three bladers. The two-blader is being bushed in a smaller size to be particularly suitable for the shafts of some of the less powerful electric motors. Prices are: 3-blader, 3s. 3d. and 2-blader, 2s. 6d.

Victory Industries' Latest

We have been waiting impatiently since the B.I.F. at Earls Court for Victory Industries to launch their Roadege and Pathfinda fittings

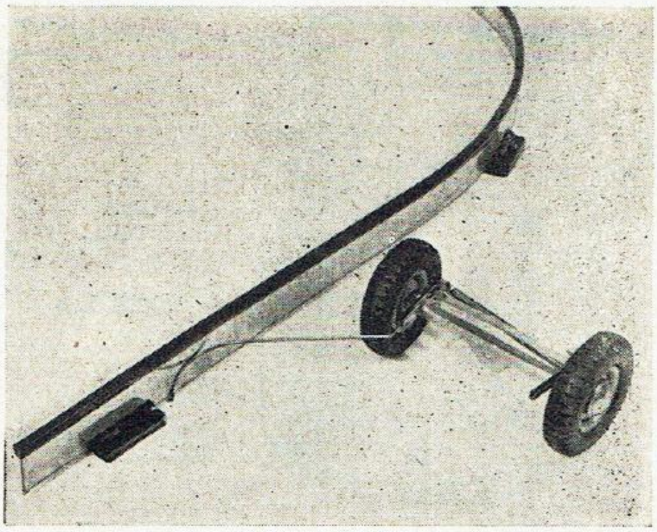


which convert their range of electrically operated scale cars to "rail track." Picture will show the basic scheme of things. A brass rail (something like a lightweight curtain rail, but plain brass strip) is supported at intervals by plastic, slotted stands, while on top of the rail a plastic protector and "jump-off preventer" is pressed into place. This track or "Roadege" can be laid in any shape, joined up as needed, and put in double track if two cars are to be raced. Then the standard V.I. car is taken and a substitute front axle, complete with wheels fitted (there are separate "A" Type for sports cars and "B" Type for saloons, which take

care of the slight differences in their design). This is spring loaded with small feelers or antennae which tend to press against the track all the time. Whatever curvature—left hand or right hand—there is, the car will always follow it. Power is normally by the standard batteries which these cars carry. If necessary, power can be fed through a "live" track surface and a return current through the roadege. Such a scheme was worked very successfully in Victory Industries' B.I.F. Stand—and even included traffic lights which the cars religiously obeyed. Anyway, these accessories are now on sale, and lazy would-be rail track enthusiasts can make up their track and be running all in a Sunday morning!

Table Top Workbench

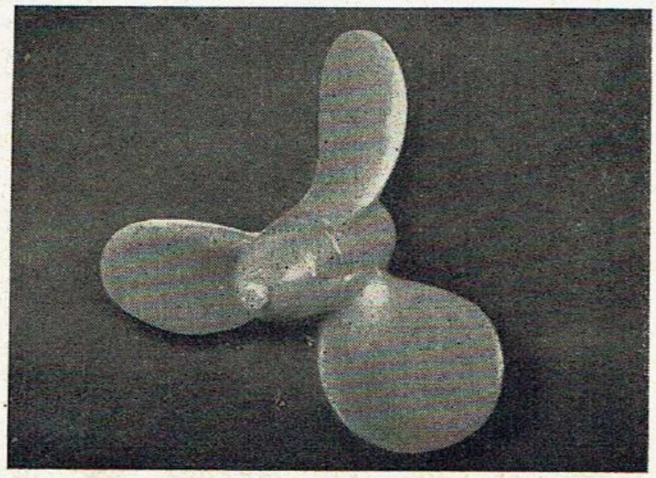
We have always had a soft spot for the Multicraft people on account of their pleasing little tool outfits and their real appreciation of the ordinary model maker's needs. Their new table top workbench is particularly interesting

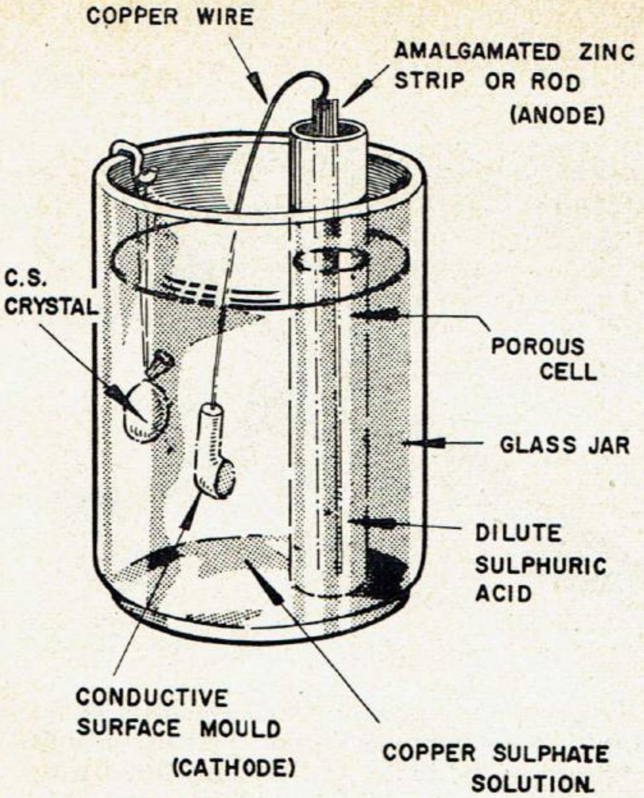


to the very many people who have little or no space for their hobby activities. This useful unit clamps on to the table, and is ready fitted with vices which permit planing, drilling, assembly and other building operations to be carried out. An ingenious system of holes and pegs adds to its usefulness, while suitable troughs hold small parts, screws, etc., awaiting attention. Bench is 21 in. long, made of Scandinavian beech and sells at 37s. 6d.

Ripmax Relay

Latest offering from Ripmax Marine Accessories for radio control constructors is their new A-30 Relay, retailing at 18s. 6d. Price is very reasonable, and the relay well finished with metal parts heavily chromed, contact points silvered, and a 6 BA bolt underneath the coil for fixing purposes. Coil resistance is 5,000 ohms, weight about ¾ oz., and adjustable as far as current change is concerned to .2 milliamp. The makers state that it will operate up to 600 cycles per second, and should be ideal for all current change receivers and for delay circuit systems.





MODELLING BY ELECTROLYSIS

AN EASY WAY OF MAKING DIFFICULT DETAILS

THERE are a good many bits and bobs which crop up in various branches of scale modelling which are almost impossible to fabricate by any normal method. Cowl vents are an outstanding example—in accurate scale they must have an air of delicacy which is most difficult to achieve by carving or casting or any other conventional process.

An easy way of reproducing such details is to electroplate them with copper; for a single item a lot of fiddling is involved, but where several similar fittings are required, the finished result is well worth the little trouble required.

The Mould

It is first necessary to produce a mould, and a one-piece mould should be used if possible; this usually means a male mould which in most cases will need to be destroyed to remove it, and the best choice for material is sealing wax. A female mould is required to cast the actual wax, and this can be in plaster or plasticine, etc., and in two or more pieces as necessary. Finally (or firstly!) a pattern is required, and this can also be of plaster or plasticine, or preferably carved from box or similar close-grained timber.

The Apparatus

The equipment required consists chiefly of a glass jar (a 2 lb. jam jar or similar) and a porous earthenware cell, tall and narrow in shape, which will fit in the glass jar and leave plenty of room for the mould. A substitute cell can be made from a toilet roll core with a card end sealed in with wax, the whole lower end for ½ in. or so being dipped in melted candle-wax, but for repeated use the porous cell should be purchased. Inside the cell rests a strip of zinc or a zinc rod from an old Leclanche battery, and this needs a length of copper wire soldered to one end (see sketch). The zinc strip or rod has to be amalgamated, i.e. cleaned in weak acid and rubbed all over with mercury applied with a cloth pad, until a silvery surface is obtained.

The Method

The surface of the mould must conduct electricity, and it must therefore be coated with a conducting agent. It is possible to use a modern metallic paint for this, but best results can normally be obtained with black-lead or graphite, applied with a fine soft brush. The mould should be moistened with methylated spirit and the graphite brushed thoroughly on, making sure that there are no "misses" but also that no superfluous graphite remains in corners, etc.

Warm the loose end of the copper wire attached to the zinc and insert it firmly into the mould in some unimportant spot (usually the base). Paint a little graphite around the junction to ensure good contact; the wire should be scraped bright to assist in this.

Now make up a saturated solution of copper sulphate and tie some of the surplus crystals into a small bag. Stand the porous jar in the glass jar and fill the glass jar with the solution, Add one or two drops of sulphuric acid to the solution, and suspend the bag of crystals in the solution to keep it saturated.

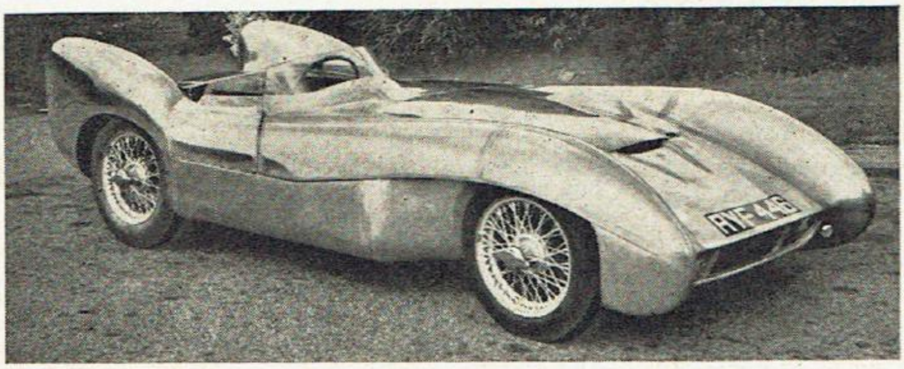
Fill the porous jar wth a solution comprising 1 part commercial sulphuric acid to nine parts water. Stand the zinc rod in the acid, with the mould in the copper sulphate solution. It is important that the levels of the two liquids are similar.

The mould should acquire a sufficient deposit to withstand gentle handling after twelve hours, and the wax may be melted out of the shell. Thicker shells will require correspondingly longer "cooking." If the mould is correctly coated, about the only thing likely to go wrong is pitting or roughness of the shell (a dark brown covering is an early indication) caused by too much current flowing. Partial withdrawal of the zinc will adjust this.

ON THE RIGHT TACK *(continued from p. 364)*

itself. A trial movement of ¼ in. should be made and the effect noted. Subsequent movements may be either greater or less as required. The performance to be aimed at, at this stage, should be such that the yacht sails to windward, but so close that the sails are on the point of spilling wind. In fact the sort of performance which two or three degrees of weather helm would be required to correct. It is worth spending quite a lot of time and care achieving this result, since it will ensure that the vane gear, when brought into use, will be operating under its proper conditions—in fact doing just the job it is intended to do, and no more.

The mast position obtained in this way will need to be checked at the first opportunity in a fresh breeze. The boom settings will be the same, but the kicking strap will need to be set a shade harder. If the yacht is very accurately balanced, it will sail in the same way with this trim in a stronger wind. Most probably, however, it will go into irons rather more readily. If this tendency is very marked it will be advisable to establish a new optimum mast position for the stronger wind (being careful to mark or record the light wind position). If the two optimum positions are reasonably close together (say within ⅜ in. or less for an "M" class yacht or larger), then a compromise intermediate position may be adopted, and later modified slightly as required in the light of future experience. If the optimum mast positions differ widely (and I have known cases of more than 2 in. difference), the yacht is liable to be troublesome to sail. I hope to give some information later on dealing with awkward cases of this kind.



LOTUS Mk. IX

1/12 SCALE, FOR ½-1½ c.c. MOTORS, RAIL OR CABLE TRACK

ONE of the top-flight sports car makers, with a brilliant record of competition successes in recent years, is the Lotus Engineering Company, whose handsome Mk. IX provides the prototype for this simple model.

We chose 1/12 scale for this relatively small car for several reasons, first of which was that this is one of the two scales standard for rail racing. Secondly, many builders anxious o run a "tennis court special" require a model small enough for even a .5 c.c. engine; thirdly, this size model with a 1½ c.c. engine is usable on a normal cable track. Lastly, but by no means of least importance, suitable commercial parts are available to help those with limited facilities.

As drawn, the model is for tethered operation, but the only modifications required for rail work are the addition of zonkers to fit your particular track and possibly the inclusion of a clutch in the transmission, if your local rules call for this.

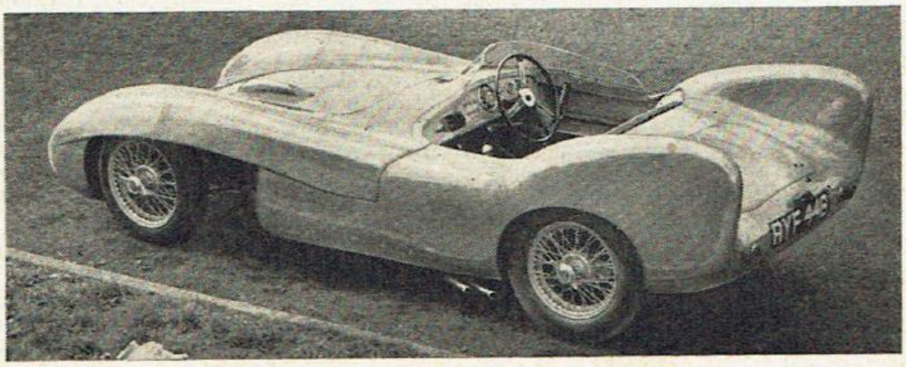
The basic chassis member is an 18 s.w.g. dural sheet, flanged up at the sides for rigidity. A clearance hole for the flywheel must be cut; this need only be a fraction larger than the flywheel if a friction starter is to be used, but naturally must allow room for the cord if the motor is to be cord started. Apart from this hole a three-sided cut must be made and flanged downward for the lower engine lug; otherwise, work on the chassis is confined to drilling holes, unless your motor's fins get in the way, when the dural may be peened out with a ball hammer over a concave lead or wooden block.

A M.R.R.C. gearbox is shown on the plan, and needs the transmission shaft cut down in length. To avoid cutting a thread, the nut of the flexible coupler can be slid in place, drilled, and pinned. Wheels are also from M.R.R.C. (normally sold as 1/16 scale). The rear axle is virtually identical to the front, and passes through two simple trunnions which can be shaped from solid brass, brass angle, or even from a stub of curtain rail.

Three Terry clips bolted to the chassis retain the body in place, U-pieces being screwed to the body to engage the clips. Lime or obeche is best for the coachwork, but hard balsa can be used if preferred. Carve away to clear the machinery, as required.

As mentioned, zonkers are an easy job to fit for rail racing, but for the average builder a panhandle is shown, by means of which the car may be tethered. Note that it can be swivelled to adjust for differing C.G. positions; a trial run will soon show what movement is needed. Use about 15 ft. of strong fish-line for .5 c.c. power, up to 30 ft. of wire for 1.5.

Many car beginners do not realise that the easy way to start their motors is to invert a bicycle, spin the rear wheel, and bring the model's flywheel (or driven wheel) hard into contact with the bicycle wheel. Compression and/or needle setting can be varied with the engine turning over, until firing commences.



We are indebted to the Lotus Engineering Co. Ltd. for assistance in preparing this design. Full-size copies of the drawing opposite are available price 3s. 6d. post free from *Model Maker* Plans Service, 38 Clarendon Road, Watford, Herts

TUCKER'S TOPICAL TALKS

THIS MONTH ON THIS AND THAT

AS most Model Yachtsmen, not only in this country, but throughout the world, will have heard, Mr. Chas. R. Seabrooke was obliged earlier in the year to resign his position as Chairman of the Model Yachting Association. Shortly afterwards, he went into hospital and had a serious operation. All my readers will be glad to hear that he has now recovered and has returned to work.

Since the War, Mr. Seabrooke has occupied one arduous post after another in the M.Y.A., as he has been Racing Secretary, Treasurer, Hon. Secretary and Chairman. In all these positions he has given unstinted work for the good of the sport and the Association.

In addition, Mr. Seabrooke has been Secretary-Treasurer of the International Model Yacht Racing Union for several years. How he has managed to do all he has done for model yachting, and at the same time earn a living, only he himself can guess. At any rate, persistent and continuous over-work has been a contributory cause to his illness, and under medical advice, he will have to take things somewhat easier in future.

Model yachtsmen everywhere will be glad to learn that Mr. Seabrooke feels that he can manage to continue in his post of Secretary-Treasurer of the I.M.Y.R.U. When Mr. O. Steinberger, late Vice-Chairman of the M.Y.A., took over the Chairman's office, he resigned from his position as appointed Council Member for the H.Q. and Individual Members' Division. Mr. Seabrooke has taken his place, which gives him a seat on the Council and a vote.

May I, on behalf of all model yachtsmen, put on record our gratitude and appreciation of all he has done for the sport.

* * *

Reverting to the remarks about model yachting lakes in my February "Talk," I feel that in discussing these, one might almost reverse the famous **dictum** about beer, and say that there are no good lakes in the country, but some are worse than others.

Yet do we want the absolutely perfect lake where there are no wind obstructions or hazards of any kind? Or would it prove as dull as a golf course without bunkers?

As a designer, I am strongly in favour of the perfect lake where all luck is eliminated, and the premium on the skippers' skill reduced to a minimum, as that would give us true tests of design. On the other hand, would racing then be as interesting and exciting as under less perfect conditions?

Discussion on these points is purely academic, as we are unlikely to get a water where the wind blows uninterruptedly from every quarter. Hence, we have to make the best of the lakes we have, and strive always to persuade local authorities to give us more and better facilities.

* * *

In the May instalment of his series of articles "Starting on the Right Tack," Mr. D. A. Macdonald advises the streamlining of the skeg and rudder. Now, my friend, Mr. Macdonald, is one of the best skippers in the country, and possibly knows more about vane steering gears than anyone in Britain. His articles have been a mine of most valuable information. Hence I trust he will not object to my querying this single point.

Let me first quote what he says on this matter: "To improve rudder efficiency and reduce resistance, the skeg and rudder should be nicely streamlined together."

In the days of Braine steering, the skeg was usually joined to the after part of the main fin. Further, in sailing to windward the rudder was locked amidships, and therefore, formed a continuation of the fin and skeg. In such cases, there was a good and obvious reason for carrying the streamlining of the main fin right through to the after trailing edge of the rudder. In fact, I myself usually did this in my designs.

With vane steering, the skeg is separated from the main fin. Also the rudder is never locked, and is hardly ever amidships. To windward, the optimum trim for the yacht needs two or three degrees of helm.

Now let us briefly consider how a rudder functions. When the rudder is put to port, it interrupts the flow of water through the port garboard angle. This sets up a steering effect which is felt in two ways. The interruption to the flow of water through the port garboard acts as a brake on the side of the boat, and the speed of the port side is reduced so that the starboard side over-runs it. Likewise, the water pressure engendered on the port side of the rudder pushes the stern up to starboard. The net result is that the head goes to port and the stern to starboard, and our course is altered to port accordingly.

How does this affect the streamlining? On the port side, the streamlining is entirely upset by the rudder. To starboard, the streamlining comes to an abrupt end at the rudderpost. Hence, it seems to me that one should keep the thickness of the skeg to the minimum necessary to take the diameter of the rudderpost, and/or as required for strength and rigidity, both depending on the size of the yacht. Of course, one rounds off the forward edge of the skeg to minimise head resistance, and tapers off the rudder-blade to avoid eddies astern. In any case, I cannot see any advantage in making the skeg and rudder any thicker than absolutely necessary, especially as a flat plate has the highest value as lateral resistance, combined with a minimum of head resistance.

However, Mr. Macdonald is entitled to his opinion, as I am to mine, and possibly I am wrong. In any case, it cannot make a great deal of difference either way, unless the rudder is locked amidships, when streamlining is highly desirable.

* * *

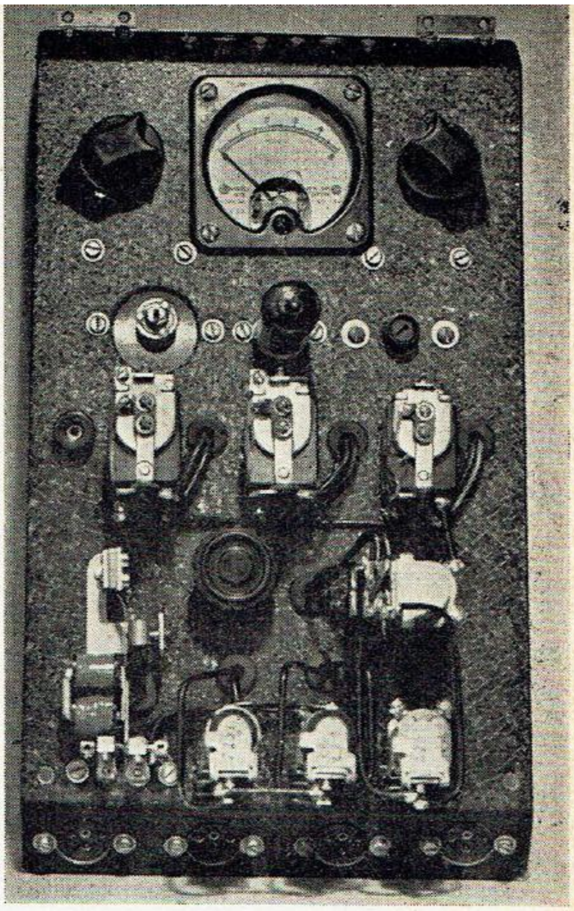
A frequent difficulty encountered by owners of new boats is a tendency to broach in heavy slams with a strong quartering wind. In a few cases, this is due to faulty design, but usually it is the skipper's fault, or lack of tuning up.

When broaching is due to bad design, the usual cause is an unbalanced hull. Even in a balanced boat, it can arise from too abrupt a turn round the midship section, resulting in a pot-bellied craft with weak shoulders and quarters. Again, if the

Continued on page 376

THREE CONTROLS FROM SINGLE CHANNEL RADIO

All the advantages of reed equipment without the expense are obtained with this system described by H. Bellamy



The completed outfit as built by Mr. Bellamy on a 12 in. x 6 in. chassis. Results obtained are equal to those given by equipment £10-£15 more expensive

IN this equipment the H.T. supply to the transmitter is interrupted by regular pulsing so causing the receiver in the boat to pulse at the same rate. As the Rx pulses, a sensitive relay in the anode intermittently charges a condensor of about 25 mfd. from a small cell. Therefore, it can be seen that by putting two relatively sensitive relays in series and parallelling them with the condensor, by altering the pulse rate, these relays can be made to pull in as required; as the current discharged by the condenser increases as the pulse rate decreases and vice-versa.

Now here is the important part of the system. The pulsing of the transmitter is very simply overcome by using vibrators (of the 6v. or 12 v. type), that is, passing the H.T. through the pair of make contacts. The fixed frequency of a vibrator is usually 120 cps. so immediately we have the first of three required frequencies. (Incidentally, a Siemens High Speed relay will easily work at this frequency.) The second frequency is obtained by taking another vibrator and weighting the armature until its frequency is only about 60 cps. The third frequency is obtained by using a small stepper relay and should be about 5 cps. So by putting these three in parallel 120, 60 or 5 cps. can be chosen at will.

Now for the sequence of operation. Normally the transmitter is pulsing at 120 cps., so on the receiving side little current is being generated and discharged by the condenser, and neither of the two relatively sensitive relays is "in," so the main motor is, say, going forward On decreasing the pulse rate to 60 cps. enough current is discharged to pull in the first relay. This stops the motor, and by decreasing further to 5 cps. the other relay pulls in as well and reverses the motor; so there is forward-stop-reverse in any desired order. (These "relatively sensitive" relays should be the 1,000 ohm type.)

Now a little about the steering of the boat. This is very simply done by putting a second sensitive relay in the anode of the receiver. (I used a Sigma wound to 10,000 ohms for the first, and a Siemens H.S. 3,400 ohms for the second.) By transmitting either "mark" or "space" the relays in the anode of the Rx. will either pull in or drop out. The first gives, say, Steering motor left, and the second, motor right. This method of steering works while the Tx. is working on either of the three pulse rates and gives accurate positional steering. (I find this better than "mark space" because with "mark space," after changing the rudder position the unbalanced ratio does not allow the rudder to remain in any one position until

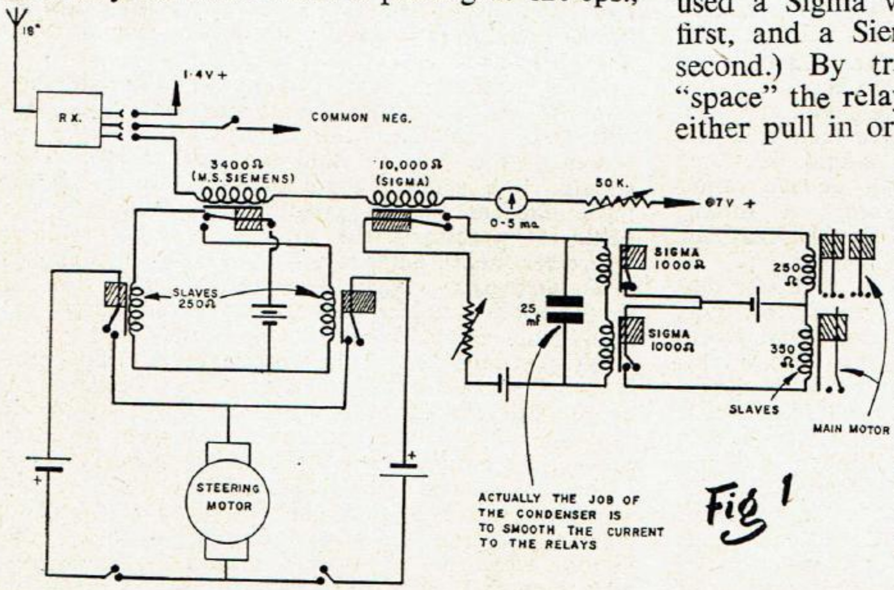


Fig 1

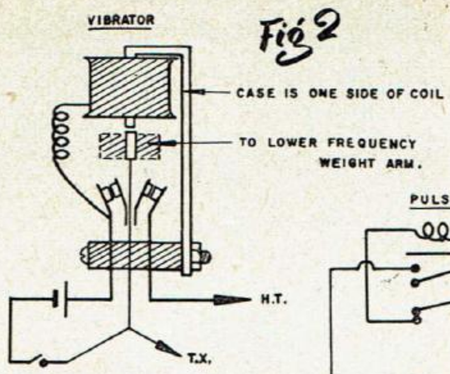


Fig 2

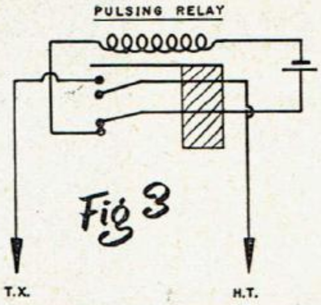


Fig 3

returned to a 50/50 ratio unless a complicated balance pot. is used on the steering mechanism.)

There is only one disadvantage with this present system, because when the Tx. gives say full mark, the first sensitive relay will drop out and the condenser will be discharging maximum current, and both 1,000 ohm relays will pull in. This can be conveniently avoided by controlling the main motor from slightly delayed slave relays worked by the 1,000 ohm relays. (In any case the time taken for the rudder to travel from left to right should only be about 4-5 secs. and should the main motor be stopped it would not be noticed.)

I have experimented with pulse transformers, but find this present system gives more accurate control, is easier to construct and is inexpensive. The equipment is not unduly heavy, but requires a hull of at least 36 in. length, especially if electric propulsion is used. The completed chassis (illustrated) is only 6 in. x 12 in. and if required can be made much smaller. I shall be fitting this gear in a 48in. tanker so space is no problem. I include a 0.5 ma. meter because it makes adjustments at the pond side much easier, and also I have fitted a pot. in series with the 1,000 ohm relays for easy adjustment. All experimental work was carried out in a Veron Marlin using a 12 v. ex.-govt. blower motor. The receiver is Doug. Bolton's design and gives about 3 ma. current change. The Mallory vibrators are easily obtained and altered, and cost about 6s. each.

Instead of using a stepper relay one can use an ordinary P.O. relay with a pair of make and a pair of break contacts. The energising current for the relay passes through the break contacts, which are closed, causing the relay to pull in; this breaks the circuit and the relay drops out again, thus completing the circuit, and so on. If one already has a Tx. and an Rx. it should only cost about £4-£5 to build the complete outfit, which I think is well worth the time and money spent, considering that the result obtained compares with 3-reed control.

As there can be several variations of this system, I should be interested to hear how anyone else has got on.

TUCKER'S TOPICAL TALKS *contd. from p. 374*

deepest part of the body is too far forward, trouble is likely, since the entry is over-steep. This may manifest itself by the boat rising abnormally high in the water and planing a few yards, often at a phenomenal speed, before "blowing up" without apparent reason. She then broaches heavily, fails to recover, and flounders hopelessly on her beam-ends. The explanation is that the steep entry has caused the boat to rise beyond the point at which her sail power will support her. She then collapses and the bows dive suddenly. It should be noted that even a well-designed boat will behave rather similarly if violently over-canvassed. A minor, but contributory, cause of this trouble may be an over-steep leading edge to the fin.

Another cause of broaching can be a rudder that is either too small or too large. The former fails to hold the boat, and the latter requires more power to operate than the vane possesses. Once this trouble is properly diagnosed, it is easy to rectify.

However, the most usual cause of broaching is that the boat is over-canvassed. This may be too large a mainsail or balloon spinnaker. Often in heavy winds, a small flattish spinnaker of silk or union cloth proves safer and more efficient than a huge balloon of polythene. Another fault is to set spinnakers with the boom too square. Particularly in a heavy quartering wind, it should be well forward as this lessens the tendency to sky.

On the other hand, the trouble may be solely due to the steering. In this connection, the first point is to check that the yacht is really getting her helm. In other words, is the vane actuating the rudder, or is the rudder overpowering the vane? To settle this question, observe carefully when the boat broaches whether the vane remains streamed down-wind, or is forced back by the rush of water on the rudder.

If the rudder is overpowering the vane, the first thing to try is an increase of linkage ratio. This will give a smaller helm angle, but increase the power of the vane to hold this against the water-stream. A smaller angle of helm really held is more efficient than a greater angle which is not held. If necessary, the vane can be set to give a greater helm angle after the linkage ratio has been increased. Again the feather may be too small, or the rudder too large. These things are really only ascertainable by experiment.

On the other hand, if we are certain the vane is actuating the rudder properly and holding the helm angle throughout the slams, but in spite of this the boat broaches, it may be that a lesser linkage ratio (increasing the rudder angle, even if it also decreases the power of the vane) is the answer, or the vane may need to be set at a greater angle. If none of these remedies produces the desired effect, it is possible that a larger rudder area is needed, even if this involves a larger feather and higher linkage ratio.