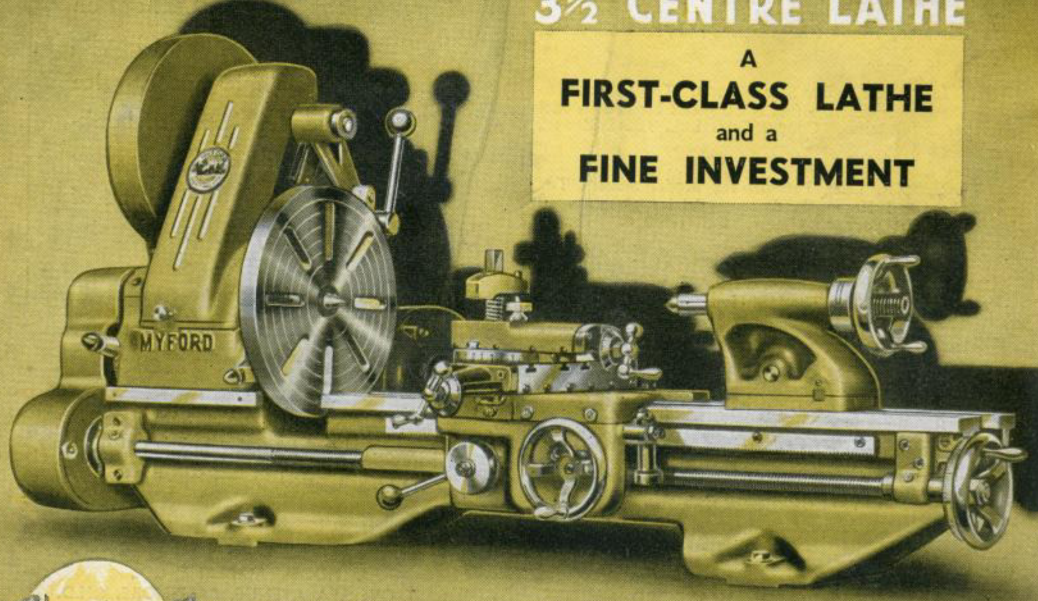

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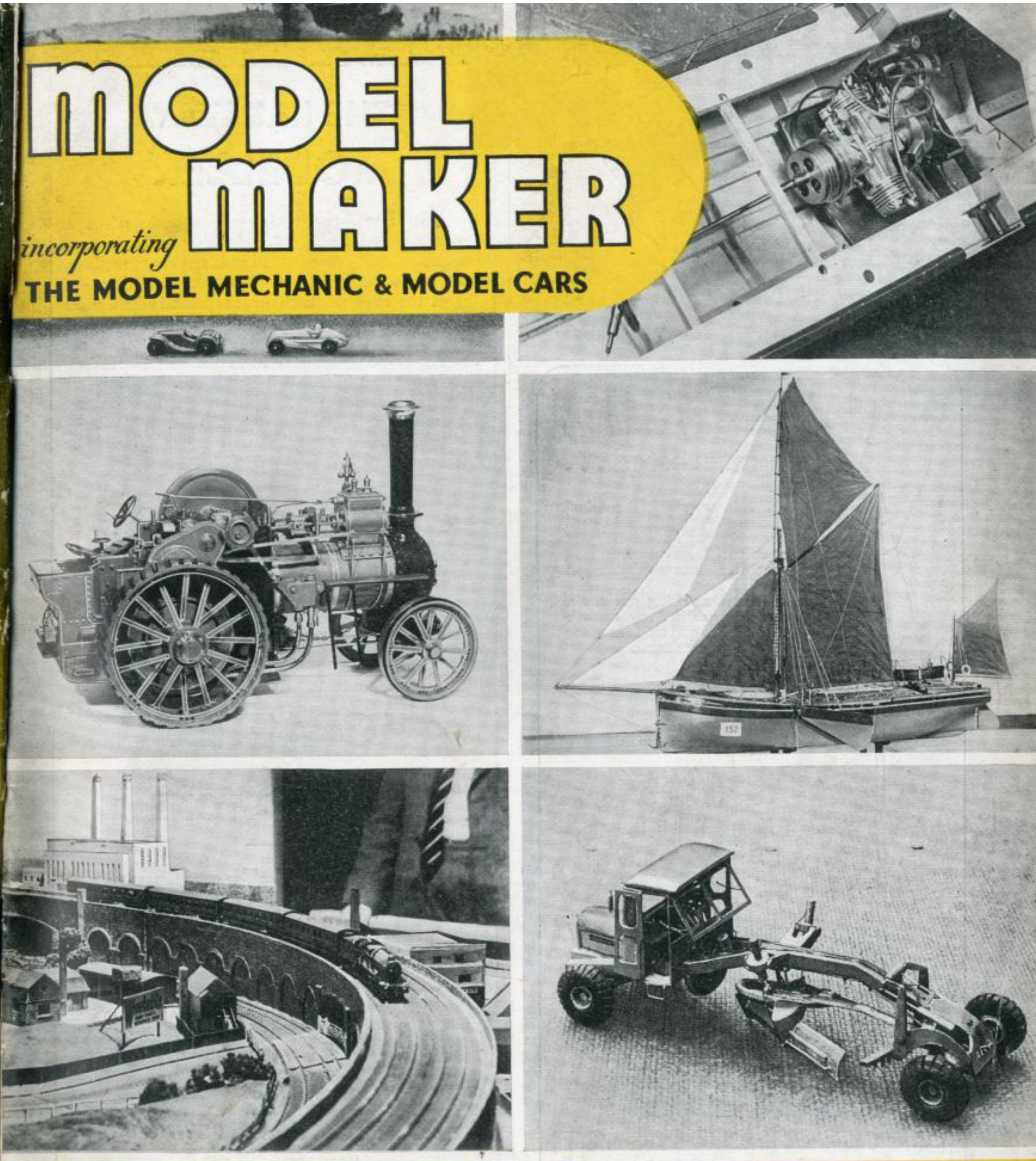

VOLUME 2 NUMBER 19

JUNE 1952

2/-

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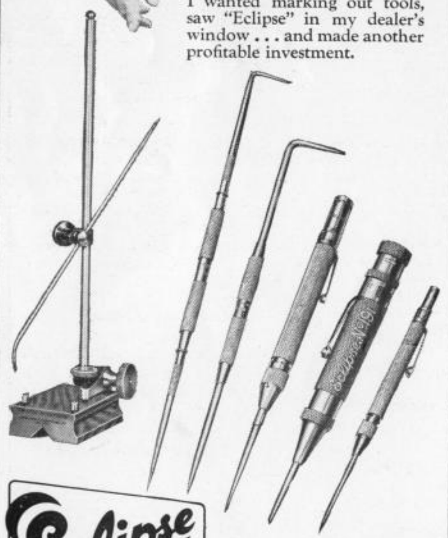

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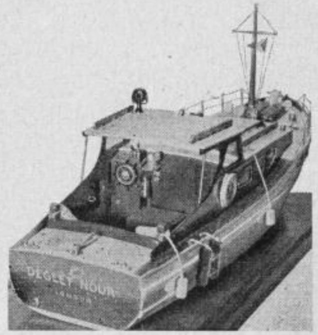

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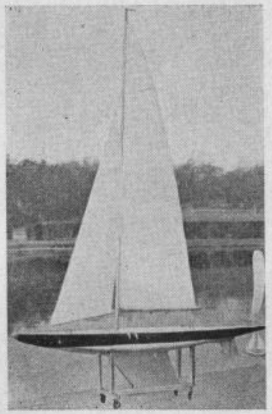

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THE MONTHLY JOURNAL FOR ALL MODEL MAKERS

Co-Editors :
G. H. DEASON
D. J. LAIDLAW-DICKSON

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Contents

VOLUME 2 No. 19   JUNE 1952

The Model Maker's Place . . .

IT is a matter of ever-growing satisfaction to discover the rapidly improving status of the model maker in all walks of life. No longer is it necessary for the enthusiasts, like Benjamin Franklin, to take some small boy with him on the more public demonstrations of his art : his products are admired by well-informed bystanders of all ages, and, far from denigrating his work to the awful indignity of toy, are more than likely to credit its designer with skill and performance that have modestly remained little more than wishful thinking on his part. The model maker is a respected member of the community, called upon frequently to perform this or that domestic magic that only one with his fine set of tools and the secret knowledge of how to use them could possibly be asked to attempt. This new age seems to have come very suddenly upon us, and must definitely be considered a postwar development. Is it perhaps the first sign of a return to craftsmanship in place of mass production, or has it the deeper significance of respect for those exercising a manual skill that is disappearing from our everyday life? Whatever the reason, there is no doubt that more and more enthusiasts are taking up some branch or other of our model making hobby, and many more are admiring those that do in the waiting period of becoming enthused themselves.

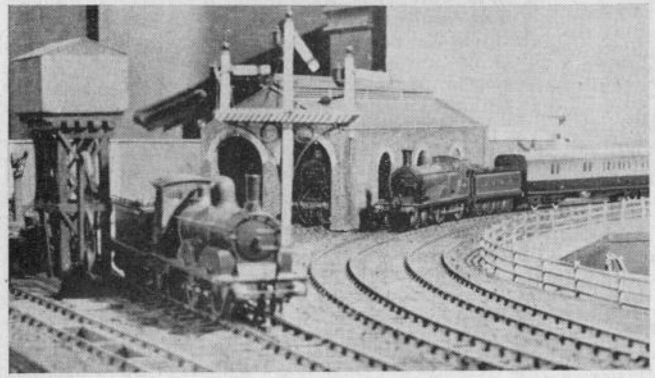
At such a time, we are particularly pleased to learn that His Royal Highness, The Duke of Edinburgh, has consented to open *The Model Engineer* Exhibition at the new Horticultural Hall on Monday, 20th October, 1952. This does indeed, mark the growing importance of model engineering in Great Britain, and sets the royal seal of approval on an activity that has long been the sparetime hobby of men and women in all classes of society. We are sure our readers will join with us in congratulating our contemporary on this signal honour that it is their good fortune to enjoy, and one that every single one of us who shares this common bond of interest can take to himself as a personal token of interest.

In this Elizabethan age we are trembling on the brink of so many sensational discoveries in all fields of human endeavour that any short cuts to knowledge made possible by those select little staffs of model makers now gladly retained on the principal industrial payrolls may well change the whole conception of their place in our daily life.

ON THE COVER . . .

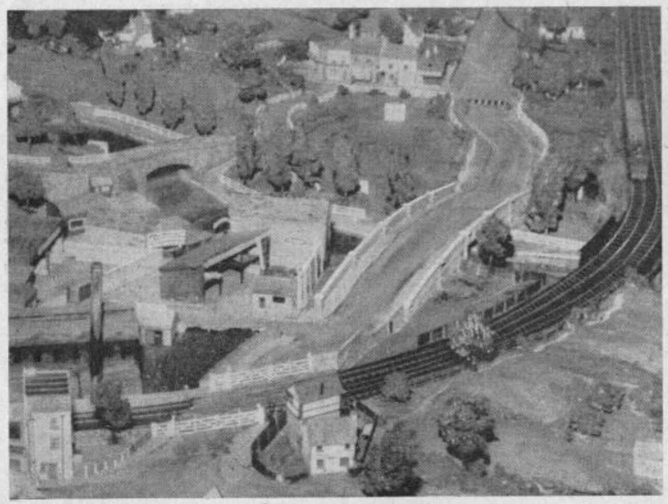
Top : Close-up of interior of 4 ft. Cabin Cruiser with 10 c.c. petrol engine by R. Gebb of Leyland from the Northern Models Exhibition. Centre left : Another Northern Exhibition picture, A. G. Bates' (Coventry) 1 in. scale Traction Engine, 1st prize winner in its class. Centre right : Thames Sprit sail Barge by G. R. Sinclair of Exeter, also at the Northern Exhibition. Bottom left : H. B. Whall's 000 scenic layout at the Model Railway Exhibition—with a four-coach train on the down gradient. Bottom right : Aveling Austin motor grader model featured in this issue. (Northern Exhibition Photos by A. Hamer. Others "Model Maker".)

MODEL RAILWAY EXHIBITION



Above: Mr. F. Bush's attractive 0 gauge fine-scale layout, based on S. Western Railway pre-1923 practice. The stud contact system is particularly unobtrusive.

Below: "Fairyland Express" or a view of Mr. Whall's exquisitely detailed 000 layout. This picture can be studied for a long time to note all the details incorporated.



IT is always a pleasant date to attend the annual Model Railway Exhibition, not only during its official opening period but in those unrehearsed and hectic hours during which bare halls are transformed into an exhibition. The "slave gangs" are all volunteer labour, there is no profit motive, only a sincere desire to put over the best possible story of the hobby to the general public, so that it has all the carefree attitude of the amateur, who is really working hard because he likes it. This year marked the first opportunity for Mr. M. N. Shaw to show his paces as Chairman of the M.R.C., an office which had been filled so long and ably by Mr. Keen, and which traditionally confers upon its holder the chief administrative responsibilities of the exhibition. No more tactful Chairman could have been found to provide that mixture of carrot and whip so necessary in organising a volunteer band: and, as one of the standholders, may we add, so solicitous of trade welfare.

In spite of the inevitable feeling that the show will never go on, everything was finished spick and span for the press view, followed by the admission of the general public. We did notice one photographer packing up after seeing only the Upper Hall part of the show, who expressed great surprise on learning that there was quite as much again to be seen on a lower level, and hastily collected the small boy who seems the inevitable centre of popular press pictures of model activities, before resuming his task.

Most visitors will have carried away most vivid memories of the various working layouts, ranging in size from 000 with a track of 9 mm., through 00, 0, 0 Fine, to Gauge 1, and finally to the passenger-carrying gauges on the live steam track. Here there was always a queue of youngsters waiting for the free rides that were their right. This "free ride" angle was explained by the Chairman, who made it clear that the M.R.C. was opposed to anything in the way of "extras" — visitors paid

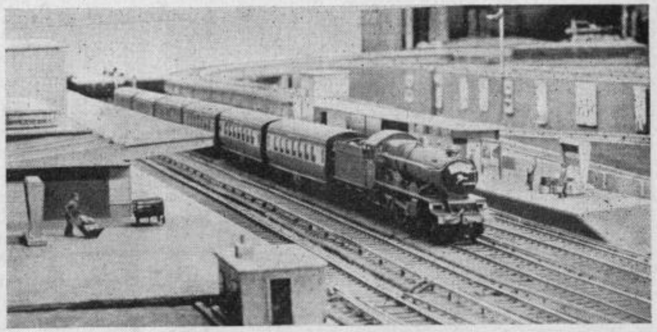
to come in and were invited to enjoy everything at the exhibition: which being so, then the youngsters could have as many rides as they pleased without additional payment. We liked this attitude which is really typical of the exhibition as a whole.

A fine selection of engine drivers were seen on duty throughout the exhibition, including most of the better known figures of S.M. & E.E., both ancient and modern, with others from the South London and Eltham Societies.

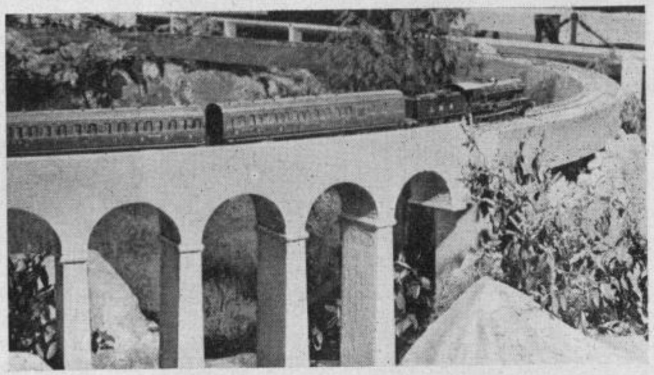
Most outstanding working exhibit was undoubtedly the Garden Railway, in a natural setting of grass, rocks and shrubs, which was principally the work of Mr. W. Banwell. The layout demonstrated was, in fact, the combined operation of two garden layout projects. Basically, it was so very simple that we are sure very many imitations will be in the making this summer. Ingredients required are: one medium-sized garden shed, with electricity laid on, anything from 30 ft. length of garden upwards, a supply of square fencing stakes, a few precast concrete pillars, some brass rail, a little imagination, and quite a lot of work.

The secret of its appeal lies, we are sure, and the designer is inclined to agree, in getting the track level away from ground level. It runs at about table height, and as such looks most attractive, runs straight into the garden shed and, again, at convenient table level, comes into its two main stations, one on each side of the shed, joined by a horseshoe of track. Some of its full effectiveness was lost at the show by the use of largish shrubs such as flowering rhododendrons, when in its natural site dwarf conifers and the like are employed to maintain the scale effect. Be that as it may, we feel sure Mr. Banwell will be in ever increasing demand for advice on outdoor layouts in 00 for a long time.

Hardest working demonstrators must surely have been Mr. Jim Beddoes and his team on the British Railways Exhibit. Our own

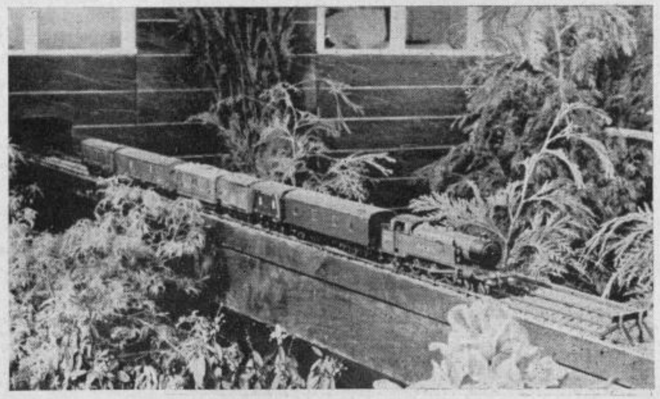


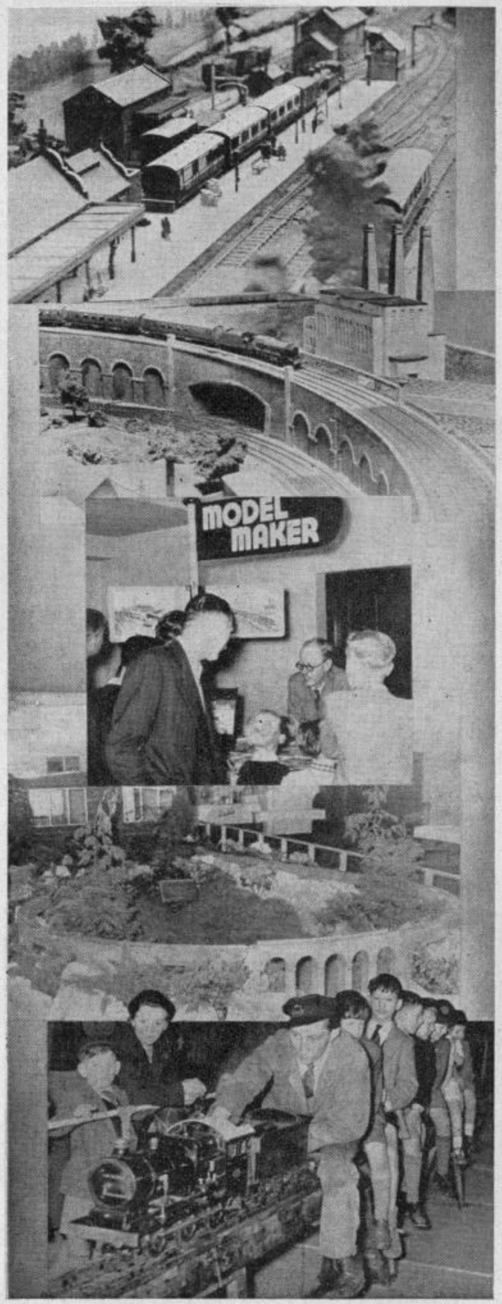
Above: Typical scene at Newtown Station on the British Railways layout. This was one of the many trains that maintained a ceaseless and regular service throughout the five-day exhibition.



Above: Viaduct at the head of the horseshoe on Mr. Banwell's garden layout. This—in the original—is actually pre-cast in concrete and has stood up to outside conditions very well.

Below: Another shot of the garden layout—this time near the shed which houses the main stations. Note the small tunnel mouth at left, through which trains emerge.





stand was just across the aisle from them, and throughout the five days of the show we never saw an idle train! This outside conductor rail exhibition layout in 0 gauge—what can be called "fineish" scale, if not precisely fine scale—is an amazing example of the high degree of trouble-free running that can be obtained during a fairly long period of practical experience. It is even more remarkable when we realise that the whole exhibit came straight from a month at the Ideal Home Exhibition, without any time allowance for more than standard routine overhaul. There is plenty of movement on the layout, no confusion, never a truck derailed, hardly ever even a momentary fault—though an excellent drill to deal with such an occurence if necessary. It probably cost the proverbial "mint of money", but is money well invested in goodwill advertising and should leave visitors old and young with a favourable impression of "our railways".

As a comparison with B.R.'s serviceable version of 0 gauge fairly fine scale, we can turn to the London & South Western Pre-1923 layout in the Upper Hall, belonging to Mr. F. Bush. Here is seen stud contact at its best. Quite frankly it needs keen eyes to detect the studs at all and, in spite of their being apparently dirty, certainly invisible, there was never a hint of any current trouble. In these days of metal shortages there may be a bigger future for stud contact. Of course, it still uses more metal than *two* rail, but apart from initial connecting-up problems, has many features in its favour. Noteworthy feature of this layout was the skilful manner in which mechanical signalling was carried out, and the faithful scale speeds observed in all running.

Then there was that marvel of miniature ingenuity the 000 gauge layout constructed by Mr. Whall. This is probably the smallest that can be expected to have any adhesion to speak of and, in a dusty exhibition provided constant worry to the operators. After all, a speck of dust represents something the size of a lump of coal—as Mr. Whall remarked at one time: "Can't somebody design some scale dust?" Some of the locomotives were no longer than a box of matches, and could pull six or more coaches. What we enjoyed was watching single locos simply racing down the back straight, slowing for the corner and then careering down again. (Such frivolous running was not for the general public's gaze, but helped to clean up the track!)

While 000 must perhaps remain a specialist size we understand Mr. Whall can undertake a certain amount of track construction and layout work for clients. With such assistance many people with limited space may be tempted into this field—and, will, we know, have great fun in so doing.

On the left: A ramdom camera round the exhibition depicts at the top: A section of Mr. P. B. Denny's Buckingham Branch Line; Below: A view of the 000 gauge layout; Centre: Our own "Model Maker" stand with Co-Editor D. J. Laidlaw-Dickson in attendance; A general view of the Garden layout, and Bottom: A full load of youngsters enjoying the passenger-carrying layout.

Opposite this smallest layout was the exhibition's biggest non-passenger carrying, the work of the Gauge 1 Club. Here misfortune dogged the exhibitors until the show had actually opened. It was too big a layout to be assembled and brought in prefabricated units to the hall, but had to be laid *in situ*, with all the snags of such work. Then, the control panel wiring went haywire, and occasioned one enthusiast staying up the whole of the night entirely rewiring. But they triumphed in the end, and no one was happier to see their fleet of rolling stock in brisk operation.

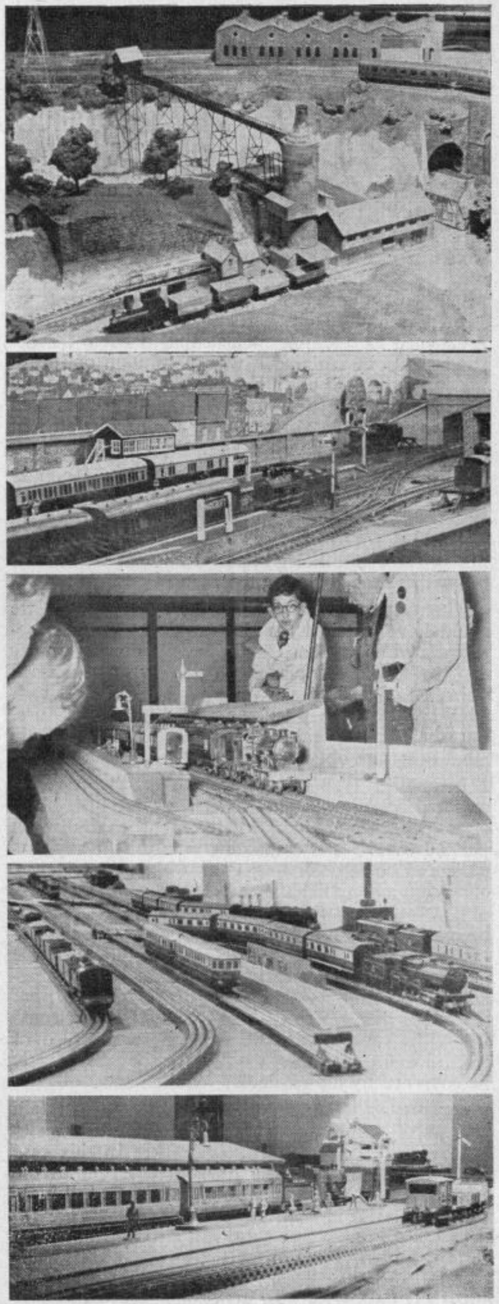
There remained only the "trade" working layouts. Here we had Trix in full swing, with their usual jolly operator, who seemed to delight in attempting the impossible—to the subsequent delight of the many small boys who helped him to sort out the ensuing melee. We were quite sympathetic towards the poor man for a time until we realised he was *doing it on purpose*, and didn't those youngsters love it! Peco with their combined *Railway Modeller* stand, made their first appearance since taking over the former Ian Allan magazine, and provided a small working layout that kept going throughout the show in a panel located above their stand. For simplicity and effectiveness it took a lot of beating.

All the cream of the trade had their stands—amongst them we were happy to have our own little *Model Maker* stall, and thoroughly welcomed this opportunity of meeting so many notable trade figures under one roof. Our next door neighbours were CCW Coach Construction Units, now under the proprietorship of Hambling Industries Ltd.

Graham Farish had one of the most attractively designed, and certainly one of the busiest, stands.

Bassett-Lowkes had their usual showcase display, while the London "toolkings" Buck & Ryan and Walkers & Holtzapffel were seen to be doing brisk business.

Apart from the working displays and trade stands, the backbone of the exhibition was made up of the usual wide variety of exquisite models, divided into their appropriate operating groups. Amongst so many beautiful models it is invidious to single out any particular specimens for comment: all, by the way, are shown as purely exhibition models—there are no cups, medals, diplomas, and the like, to tempt out the pot-hunter! We should be less than human, however, not to say *something* of what appealed—and will plump for a model of "Old Copper Nob" from the Furness Railway, as the exhibit we were most tempted to slip under our coat! The most practical novelty seen was a revolving jig in which a partly-finished model could be located and turned for painting or other detail work.



On the right: Top: Some more amazing detail work from Mr. H. B. Whall's 000 gauge layout. Below: Close-up of the shed-located station Maycroft on Mr. Banwell's garden layout. Centre: The Gauge I working layout that performed very happily after some sad and difficult times getting into its stride; Part of the extensive Trix layout that afforded a lot of amusement to the public; Bottom: Another realistic shot of the Gauge I layout.

. . . On the Right Track

R. WATKINS-PITCHFORD'S REGULAR 00 FEATURE COVERS SOME POINTS ON LAYOUT

IN earlier chats in this series we have discussed in some detail the procedure for assembling a specimen length of track using a cork "ballast unit" with fibre sleepers laid individually into the slots and the rails fixed to the sleepers by threading on baseplates which, in turn, were held down to the sleepers by strong adhesive. The surface of the cork unit was roughened to resemble ballast and toned to the desired shade by staining it with a solution of Indian ink in meths. And you may remember that we put finishing touches to the rails by painting them with a thin brown paint, so that only the narrow strip of rail table showed polished as in the real thing.

The particular type of track we selected for making up our specimen length was in flat bottom rail. But we could equally have used bull-head section rail held down to the sleepers with metal chairs, the lips of the chairs being clinched into the web of the rail with a special closing tool.

Then again, instead of using ballast units, we could have fastened the sleepers down to the baseboard, or to a sub-base, and then laid down granular cork ballast kept in place with adhesive, and pressed down into shape so as to form a banked road bed. This is a somewhat tedious and messy procedure, but there is no gainsaying the excellent realistic results that are obtainable.

In another type of track altogether the rails are soldered down to metal strip sleepers, the little blobs of solder being made to represent chairs when painted over. It is something of a job to an inexperienced constructor to get these blobs of solder of consistent size and shape and, of course, this method of construction is not suitable for two-rail operation, because the two rails are short circuited through being soldered to metal sleepers. Each different type has its advantages and its drawbacks but, on balance, the voting would appear to favour the fibre sleeper, if the railway is to be indoors and protected from rain or excessive damp. As to the type of electrification to choose, the constructor must largely be governed by his particular requirements.

He may, for example, have already a certain amount of proprietary track laid down and wish to extend it by constructed scale track. In this case his constructed track will have to conform to the existing track in the matter of using two-rail electrification with systems such as Graham Farish, Rovex, etc., and centre third rail electrification with Hornby Dublo, Trix, etc.

If he is making a start from scratch then, in addition to those types just mentioned, he can choose between outside third rail and the stud contact system. But to the constructor who has had no previous experience of model railway work, a safe choice is the realistic and well proven two-rail system. Many makes of loco and rolling stock are either designed to run on this type of track in the first place, or can be converted for use therewith at reasonable cost.

We have previously gone into some of the pros and cons of the various systems of electrification and so there is no occasion to cover that ground again.

Assuming then that the thorny problems of flat bottom versus bull head and two-rail versus three have been settled, let us see where we go from the point of having completed our specimen 3 ft. of track made up from the components in the Track Pack.

The general plan of our layout must be decided upon before track-laying begins. In fact, as wise platelayers we shall either have drawn in accurately to scale the exact outline of our road bed on the baseboard itself, or else we shall have taken cut-out paper shapes representing straights, curves and points, and pinned these in position on the baseboard. These paper shapes can either be cut up with the domestic scissors, from brown packing paper or, better still, they can be bought from our model shop ready cut to shape and with the sleepers and chair holes printed on. When we come to fix these shapes in position, one matter will probably surprise us and that is the length which must be allowed for a simple turnout or point. Many a railway fails to "work out" in practice to the rough plan originally contemplated, because of failure to allow adequate space for the points.

The length of track occupied by a point depends, of course, upon the radius of the turnout and if—as is usually the case—every inch of run is precious, we may be tempted to economise by using a sharp turnout. Perhaps if our railway is to run only locos of short wheelbase, such as is implied by the 0-4-0 arrangement, slight economies can be effected here, but, in general, it is a safe rule to decide that the minimum radius of the point itself shall be 3 ft. for 00 gauge. Once the train has been led through the point, the radius of curvature can be reduced as required.

A 3 ft. radius point in 00 gauge will require a baseboard length of 8½ in., and we should provide for this in drawing up the plan of our layout.

A crossover between two tracks, consisting of two turnouts of the same hand, placed face to face will occupy somewhat over 17 in., if a short length of straight track is included between the two turnouts so as to avoid a sharp reversal of curvature.

The diagonal or diamond crossing does not present any great constructional difficulties, but the slips and the scissors are best omitted from the layout until the constructor has had some experience in track laying. As in real practice, they can always be added at a later date, if and when the traffic requirements clearly indicate the necessity. The exact extent to which the operating scope of a layout can be widened by the inclusion of the more complex point formation is very difficult to assess without actually running the trains themselves, and this implies layout of the track first. It is relatively a simple matter to perform trial and error experiments when using track units of the kind supplied with proprietary train sets, because these can be clipped together and taken up again for an alteration to the layout in a matter of minutes.

But when the experimenting has to be done in terms of scale track laid to precision limits, one is inclined to think twice. In laying track for a model railway, one is constantly being called upon to compromise between what is accepted as good practice in full-sized work and what is expedient for a model layout. And the problem is not made easier by the fact that the model railwayman is usually not a professional civil engineer and, therefore, has to rely upon his own observation over a fairly long period before he can decide what is and what is not permissible.

Consider, for example, the through station in Fig. 1. Here the station can be served by the bay road (BR) or by the Down Slow (DS). Trains on DS, whether stopping at the station or not, can either continue along DS, or take the branch line BL. The crossover at C enables down through (DT) traffic to take the branch if required. It occurs to us, however, that if we move the crossover C to the position shown in Fig. 2, we can now feed the bay, the down slow and the branch from either DS or DT.

But perhaps we feel that this is unsafe, because a train on DT crossing on to DS and intended to take the DS line without stopping at the station at all, might foul the facing points and enter BR at speed. So we do away with our bay and redesign the station to provide a loop line and an island platform. We can now serve either the loop or the branch from either DS or DT and this increases the facilities still further, as in Fig. 3.

In point of fact, even a layout of this kind would not be tolerated in full-sized practice, unless special precautions or speed limits were imposed.

Messrs. B. J. Ward Ltd., are marketing this new station accessory featuring a W. H. Smith bookstall of the more modern design — we cannot see if "Model Maker" is on sale !

But it illustrates the point that the moving of the crossover C and the inclusion of the loop in place of the bay, opens out additional facilities at our through station which, in turn, would affect the timetable running of the entire system.

It all becomes rather a problem of the hen and the egg variety. We can't have a timetable schedule without first building a layout, and we can't build a layout—successfully at least—without having some idea of the timetable running it will give.

And so we compromise. We sketch the thing out roughly on paper first. Then we have a "preliminary canter" by pinning down paper shapes representing track and point work. We consider this carefully and try to assess its scope in terms of traffic facilities. And then we shut our eyes, hope for the best and start platelaying.

Of course, we shall make modifications when the weaknesses of our layout become apparent. But then that is precisely what our professional brethren have to do. And that is why they will tell you that there is no such thing as "permanent" way.

FIG. 1

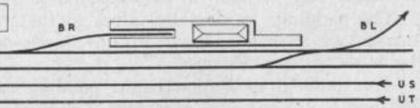


FIG. 2

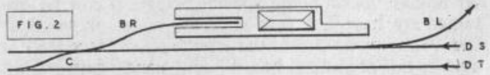
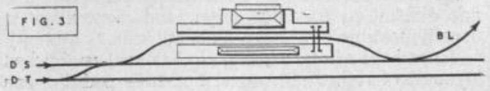


FIG. 3



Improving the Miniature Railway Layout

H. A. ROBINSON DISCUSSES MODEL ACOUSTICS AND A SIMPLE LINESIDE TROLLEY HUT

Model Railway Acoustics

THE locomotive itself is still, of course, the king of noise-makers, and all railway lovers can recognise the staccato beat of hard working and the tornado of sound as "drivers" spin to an open regulator.

These are all part of the complete railroad scene and are as inseparable from it as man from his shadow. Unfortunately, however, the model railroader cannot as yet buy miniature noises—a set of rail beats "in strong cardboard box" is still beyond the commercial producer (although there has been some attempt to give locos a "puff"), but the subject of acoustics is so interesting that it is quite worth the attention of the craftsman, for in certain limited directions noises can be fostered or quelled.

An effort that most model railwayists might make in this direction is to localise bridge noises to bridges. Many layouts built waist high on fairly thin baseboards emit a hollow noise every time a train moves —no matter where it is. I remember one otherwise excellent system in a largish room where it was impossible to carry on a conversation when a train of any size was in motion, due to the drum effect of the base.

This, of course, was all wrong, but the noise could have been usefully employed had it been kept to the several bridges. And this would have been possible by covering the base (or just under the tracks) with very thin felt or baize, for an underlay of this kind quietens down a train to a remarkable degree. In this method of "toning down" the felt is discontinued at bridges which means that while quiet, or quieter, running is obtained on what is supposed to be solid ground, a true-to-life roar comes about as spans are crossed. In this way a certain "colour" is given to the running noises and a further angle of realism added to the layout.

The padding, incidentally, gives to the track an amount of resilience which certain experts consider helps locomotive efficiency.

This method of stop-and-start padding can also be used to boost noises elsewhere if desired—say in a cutting. When an extra loud noise would be an advantage, as on some special bridge, it can be obtained by having a thin sheet of metal or wood at the back (away from the observer). Placed so it acts as a "sounding board" and sends forward an increased volume of noise. As most model lines cling to the perimeter of a room such an addition is not difficult to fix in position, and camouflage is usually possible to prevent its being seen as a board.

To pad the whole of a big, already well-established layout is a rather tall order, but strip padding can be started at any time with new track and then extended as relaying takes place.

A toning down of general train-running noises gives a chance for other and more subtle sounds to come to the notice, and one of these is the click of rail joints. Realistic clicking cannot be obtained with tinplate wheels, but with Mansell and other solid-running varieties it is certainly produced as far down the scale as gauge 0. To get a "click" there must, of course, be a gap at the joint. Rails pushed tightly together form, in effect, a continuous strip of metal and so no noise is given out. If the correct sound is wanted, therefore, see to it that there is a marked space between adjoining ends. It is not hard to get this with the slip-on fishplates, and uniformity can be secured by inserting a piece of tin of suitable thickness between the lengths as they are being adjusted in the plates.

By widening the gap the clicks at joints can be made more pronounced, but widening should not, of course, be carried beyond reasonable limits.

To get a realistic clicking and other subtle noises a train must be made to run very quietly within itself, which is rather a different thing to reducing any drum-like effect of its motion over the baseboard. The most silent running vehicles are those made of wood, as comparative tests with wooden and metal trucks will soon prove.

In search of less noise vehicle bearings should always be kept well oiled, for the sound-dampening effect of a good lubricant is greater than one might imagine. Thick oil reduces noise more than thin.

The best all-round lubricant is light grade motor oil. This is fairly "thick" as far as models are concerned, and has the advantage of "staying put" and not gumming or getting sticky in cold weather.

Make a Rail Trolley Hut

AN interesting model for any miniature system, and one not often seen, is a lineside hut for platelayers' and inspectors' trollies. These huts are invariably of the sloping-roofed kind, and often house a power car, and non-powered trolley which can be hauled as a trailer. Sometimes a non-powered trolley only is housed.

The storage hut is built as close as possible to a set of rails for quick "launching" purposes. On branch lines this means being alongside the main running rails. A concrete or sleeper path is built from the hut to the track along which the trolley is rolled on its flanges. When over the rails it is either manhandled on to the "irons" or swung into position by a simple form of pivoted jack—the whole vehicle then being raised and turned through a right-angle. Sometimes the sheds have doors. Other types are open, the cars being chained to a permanent anchorage to prevent malicious interference by miscreants—or accidental rolling out.

Now to build a hut. The dimensions given are for gauge 0, but they would do all right for gauge 1 —for 00 and HO they should be halved. First prepare the pieces as follows: —

A base 4 in. x 2 in. and $\frac{1}{4}$ in. thick; Roof $2\frac{1}{2}$ in. x $4\frac{1}{2}$ in.; Back 4 in. x 2 in.; Two end-pieces as (A), $\frac{1}{8}$ in. thick; One partition (B), $\frac{1}{8}$ in. thick.

The parts are held together by glue and small model maker's pins.

At the middle of the base and roof cut channels $\frac{1}{8}$ in. wide and about $\frac{1}{16}$ in. deep. These are to take the middle partition which simply slides into position, being held with a touch of adhesive along the edges.

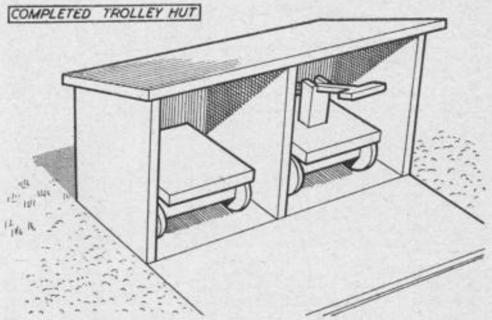
Assemble from the base. First attach the ends. The pins, it will be found, can be pushed home by something hard, tapping not being necessary. Next put in the back. This lies over the base to which it is pinned, but on the inside of the ends which are pinned to it. This makes a very rigid little structure.

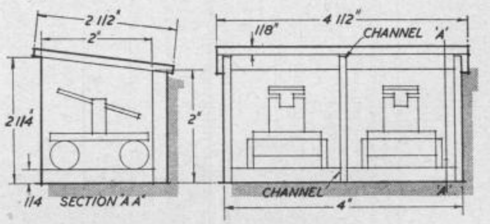
Bevel the upper edge of the back to agree with the slope of the end pieces and put on the roof with pins through to the top of the back, and two carefully placed pins into the upper edge of the ends. Finally, slip in the centre partition, clearing out the channels and generally working on it till a good fit is secured. Sandpaper the front edge flush with the base.

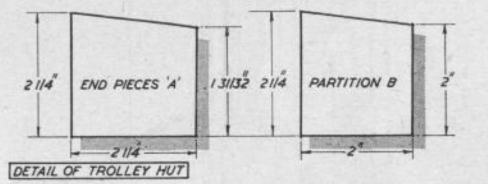
Colour the hut so obtained jet black to represent the tarred effect so often found in line-side cabins.

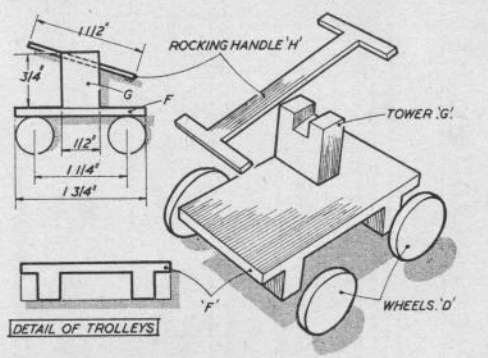
Now make the model trollies as E. These are only dummies, and quickly made, but they look very well. The one is simply a flat trolley, wheels (d) being held by pins or glue to the body (f). The wheels are $\frac{1}{2}$ in. dia. discs sliced, say, from a piece of dowel, and the body a rectangle $\frac{1}{4}$ in. thick and $1\frac{1}{4}$ in. and $1\frac{3}{4}$ in. in width and length. It is shaped below as shown so that the platform only appears to be $\frac{1}{8}$ in. thick. The wheels are set $1\frac{1}{4}$ in. from one pair to the other. To give relief, colour the trolley buff and mark in spokes in black.

The other vehicle can well be finished as the hand-driven type of trolley which is quite popular on some systems. To do this make the small "tower" (g) and the rocking handle (h). The tower is from a solid piece of wood, and the handle from a strip of very thin ply or other wood fastened to its top, which is cut away as shown and sloped to give a tilt. Again paint buff.









Both trollies are glued in position inside the hut.

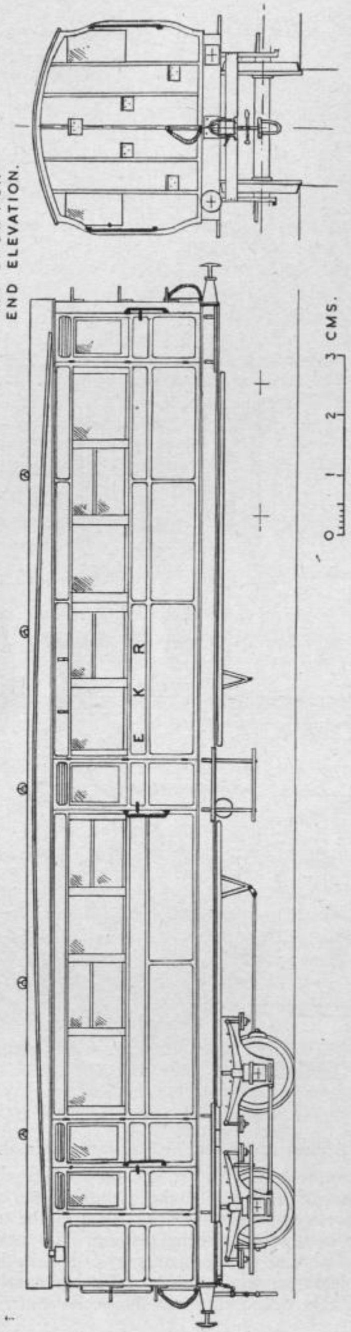
To complete the whole "picture" place the hut near a set of rails and make a path, either with a little plaster or wooden strips, down to the track—also across it level-crossing fashion. To stand out well this should be painted grey. If you have a model platelayer who could stand permanently near the hut, this would improve the scene still further.

PASSENGER STOCK OF THE E.K.R

PT II: A. H. DADD, B.Sc., DESCRIBES THE PICKERING BOGIE COACH

E.K.R. PICKERING BOGIE COACH

NOTE: FULL BOGEY DETAIL NOT SHOWN ON END ELEVATION



HOW few of us realise the comparative luxury of travel in bogie stock compared with the bumpy, jolting ordeal, which characterised travel in the days of the old four-wheeled stock.

If the experience of travel in non-bogie stock still attracts, it can be had. The Corringham Light Railway, a little line of only 2¼ miles, connecting Corringham with Coryton, still uses four-wheeled coach stock on its regular two trains a day schedule.

The first of the bogie stock to be acquired by the East Kent Railway, was a Pickering Coach, for which drawings appear this month. Built by R. Y. Pickering, of Wishaw, dimensions were: Length 41 ft., width 8 ft., and height 11 ft. The bogies were small as compared with present day standards, having a wheelbase of only 5 ft. 6 in. and 3 ft. 1 in. diameter wheels. Seating capacity for 32 was provided.

It is doubtful if the purchase of this bogie stock resulted from a desire on the part of the Company to provide more comfortable travel, but rather as a means of providing for an expected increase in passenger traffic. The many extensions envisaged by the Company with the aim of increasing traffic would have necessitated an increase in stock, but unfortunately these extensions remained unfulfilled, and the increases dreamed of never came true. However, the Pickering Car was put into service and used until the introduction of more modern stock purchased from the S.R.

After the war in 1945, this car was still to be seen in the sidings at Shepherdswell, where the accompanying photograph was taken in 1946. Nationalisation, which brought the closing of the railway, was also the end of the coach. It, together with the remaining stock, was cleared in 1948.

Constructional Details

With the exception of a few details, for example the bogies, construction follows closely that described in previous articles. As for materials to use, wood and card appear most suitable for the sides and ends. Cut these out, including the windows. They are both flat so no difficulty should result. Care will have to be taken, however, as the window frames are the only support for the upper part of the sides. The guard's look-out is easily shaped out of card, or if wood is preferred, millimetre ply can be used. In the latter case, it will be necessary to steam the ply to the correct shape before fixing. Add the panelling from strips of thick paper as previously described. Glue the sides and ends together. The end steps can be constructed from brass sheet. Cut a strip to the correct width and then cut off pieces to twice the size of the step. Bend across the centre at right angles and glue in position. Glaze the windows and add the floor.

The Underframe

The steel underframe of the prototype is best reproduced by using brass channel which can normally be obtained ready made. If it cannot be bought, or it is decided to make it up, a simple jig will be found worthwhile. Select a piece of really hard wood, and cut a groove in it the width of the channel. Obtain a piece of brass (or other metal) bar just a little less in width than the groove. This now forms a very simple press tool, and providing not more than 36 s.w.g. brass sheet is used, will prove quite satisfactory for the shaping of channel underframes.

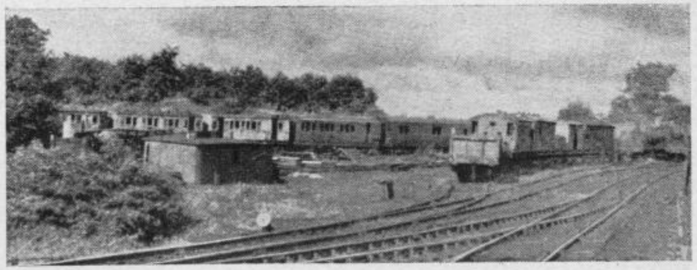
Add the V-hangers cut from brass, stepboards, buffers, and couplings.

The Bogies

At the present time, only castings for standard bogies are available. The choice is therefore between adapting these and building them up from sheet. The short wheel base is the difficulty in adapting commercial side frame castings. The only way is to cut the castings and rejoin by soldering a strip of brass behind the break. This, however, is not really worthwhile, as much filing will still be necessary to give the correct detail. A better job can be made by using axle guard castings soldered on to a brass side frame. Proceed as follows. From 26 s.w.g. brass sheet cut out four identical side frames, and on to these solder tender axle guard castings in the correct position. Several types of tender axle guards are available on the market, and the type nearest the correct one should be chosen. Final detail can be added with small blobs of solder and careful filing. The nearest commercial wheels available at 12 mm. dia., representing 3 ft. on the prototype, near enough for all practical purposes.

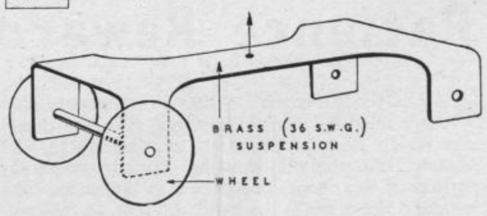
Many modellers complain of poor running from bogies built in the standard way, i.e., plain bearings in white metal cast axle guards. This can be solved by fitting suspended wheel assemblies. Commercially made bogies of this type are available, in standard types only, and give very smooth, free running.

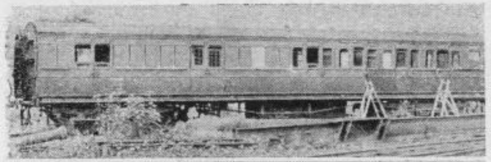
(*Continued on page* 406)

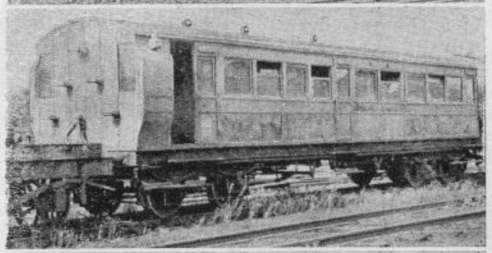


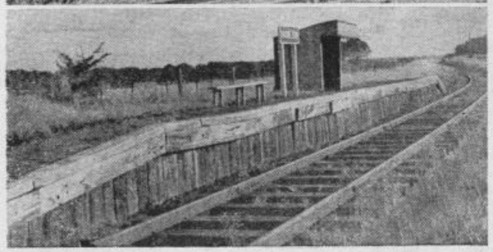
Above: A graveyard of old-time stock. The yards at Shepherdswell, E.K.R., in 1948. Below: E.K.R. Coach No. 6, one of the bogie cars that superseded the Pickering bogie. Below centre: Pickering Bogie Coach for which drawings are reproduced. Bottom: The symbol of a light railway — the Halt. Knowlton Halt on the E.K.R., an excellent prototype for light railway modellers. (Photos by the author)

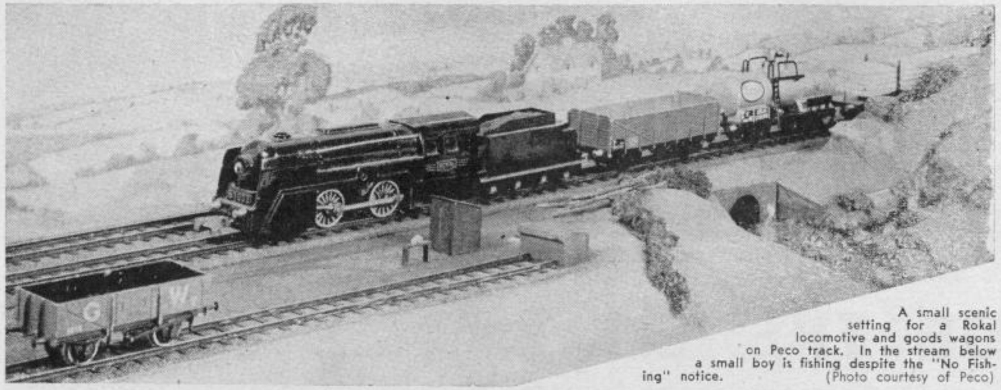
FIG. 1











A small scenic setting for a Rokal locomotive and goods wagons on Peco track. In the stream below a small boy is fishing despite the "No Fishing" notice. (Photo courtesy of Peco)

Patience Rewarded

MANXMAN REPORTS TT EQUIPMENT COMING THROUGH

A CORRESPONDENT writes in to suggest that there must be something wrong with the drawings which we reproduced in this column (*Model Maker*, January, 1952) showing a side-by-side comparison of two locos, one drawn to the scale of 3½ mm. and the other to the scale of 4 mm. to the foot.

"Surely," he says "so small a matter as half a millimetre to the foot would not account for such a great disparity in size as your drawing suggests."

On the face of it the difference *is* surprising, and it is even more a matter for surprise when you see the two locos "in the flesh". But let us look at it in this way. There are 304.8 mm. to the foot and, therefore, a scale of 3.5 mm. is 1/87th full-size, and a scale of 4 mm. is 1/77th full-size. But this ratio of 1/87th to 1/77th expresses only a comparison in terms of linear measurement. On the drawing board we are concerned with a two-dimensional plan and must, therefore, compare the squares of our scales, whereas in the model where we are dealing with solid bodies we must compare cubic measurements.

A criticism that is sometimes levelled at "these diminutive scales" is that the layout is apt to become "all picture and no railway". But surely that is a matter of degree—and of personal preference.

Throughout this delightful hobby of ours it is a question of compromise at every turn. One man, given the facilities and the mechanical skill, may find his recreation in building a live steamer to a ¼ in. scale. For the next man Eldorado lies in the direction of representing a typical section of countryside through which miniature trains will pass to and fro upon their lawful occasions, completing the illusion of make believe by which he is enabled to effect a timely escape from harsh realities.

Since most of us can afford only a few precious square feet in which to indulge our fancies, it follows that a more comprehensive and, therefore, a more satisfying countryside can be built to a small scale than to a larger one.

The limiting factor surely is the operational reliability of the trains themselves. If we insist upon adopting so minute a scale that our locos have not the necessary track adhesion to operate realistically, then we defeat our object.

Again it is a matter of degree. But a few short years ago the 00 gauge railway was looked upon with incredulous amusement as something of a freak and unworthy of serious consideration.

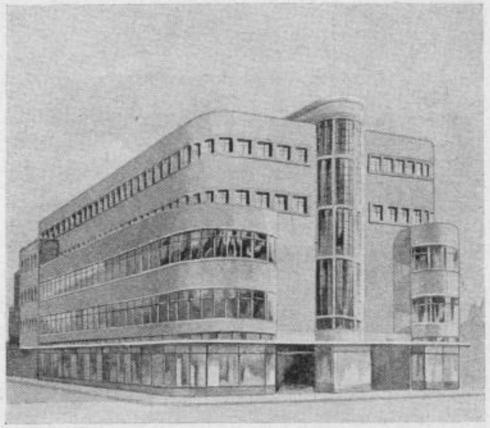
Today the complete operational reliability of the TT gauge railway is—justifiably—accepted as a matter of course. Its small modelling scale of 1/9th in. to the foot (1/108th) gives what many will consider to be just a nice balance between the railway and its scenic setting; it enables a large section of countryside to be included in a relatively small space and the reliability is such that a layout can be operated for hours on end without attention or adjustment to the locos.

As to the availability of TT equipment on the market this has, admittedly, called for patience in the past. The precarious nature of the raw material market has deterred British manufacturers from embarking upon the considerable tooling and machining costs necessary to produce locos and rolling stock and the general austerity measures prevailing have checked importation from abroad.

In this latter direction, however, it is pleasing to be able to report that the formalities of quota allocation have now been settled and that shipments are arriving in substantial quantities. By the time these lines appear in print distribution should be on a general scale, and many who have realised the great possibilities of the TT gauge railway will be congratulating themselves on having waited patiently for a good thing.

A Modern Department Store

BY VICTOR SUTTON



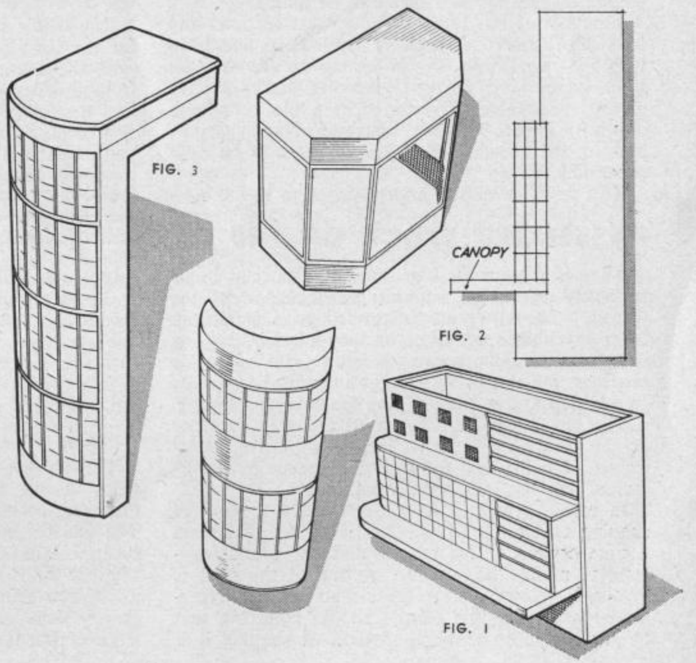
ONE can make up a modern store to grace the corner of the layout if you intend to have an up-to-date main shopping centre. Design the layout so that this model comes in on a wide road to give the best results.

First of all decide on the height and the depth and although this design only shows a frontage the model can be given more depth by adding and continuation of the side section, which can be made in two pieces and added complete with a flat roof. The design shown includes a canopy which could be an improvement, and would probably be added if the store had a long road frontage on the two sides.

In Sketch No. 1 the framework is shown, and this should have strong plywood ends to keep it rigid. One end would be rounded if it is the completion of the building, but the end to fix on the main frontage would be square and designed to fit on in the normal way. Uprights are added crossways as shown, and struts on the rear part keep it all in line. There would be two rows of windows in the red brick section, and these are fitted to the cross bearers, which should be fairly stout in structure. Do not use flimsy wood for these parts. A cardboard strip ½ in. deep should be fitted round the top and the same treatment is used above and below each window.

To get the best effect in the window try and use a thick strawboard, otherwise you cannot get the bevelled edge which is so realistic in this treatment. Modelcraft red brick paper can be used for this. The strips down between each window are done in cement shade flat paint, proper modern trend in this type of building.

Measure up the transparent material and try to get this as stout as possible, otherwise it invariably creases up after a time and cannot be remedied later. Line in the window bars in the flat stage with



white or black Indian ink. If you mark all the windows and their correct positions in the long strip you will save considerable work and avoid clumsy mistakes. The various sketches show the complete treatment here.

Very modern in style are the deep double set of windows which are obviously showroom accomodation. Allow this section to jut out by ½ in. The bars on these windows should be made with strip wood and stained in dark shade, and it is wise to do this before fitting in position. Build this section up complete and then add to the main building. Before fixing cover the wall at the back with a pale shade of paper. The treatment here is mostly of pale brick or glazed material of marbled effect.

In designing this section allow full depth for the shop windows underneath, and this proportion is shown in Sketch No. 2 which gives a side view.

I like to make the shop units up separately because it makes a neater job, saves time, and one can add little piles of imaginery merchandise. Tins can be made from ⅛ in. dowel rod, little heaps of other lines can be worked up in brilliant shades of glitter-wax.

The canopy you can add last, and this should be about 1 in. wide and ½ in. deep. Some of these are frosted glass, but many are a type of flat-leaded roof.

If you make a sound job of this part, then tackle the end which is a little more complicated, although I have shown the tower superstructure and projecting display rooms which can be added.

First of all build up the main flat section, and here the two sets of windows continue to match up with the two sides. In connecting up see that the brick paper tones in well otherwise you will have a very noticeable division. Leave the base with depth for arcade windows, which are planned separately in the sketch. Here again these can be built separately.

This now leaves the imposing design which runs right down to the top of the shop section and builds up over the main front. In the small sketch is shown the build-up for this, and if this is closely followed you will have no difficulty in putting in the windows. As there are many bars to these windows I propose that you add strips of black paper. Thicker card in cream can then be added to go round on the bow shape; ¼ in. strip wood should be used for the downward bars. Note the deep facia panels on the base of the windows, and for this one can use flat black paint or Indian ink.

The projecting and semi-rounded bays are most attractive, and these are simple to make if you tackle them quite separately and then glue them on. In the small sketch No. 3 you will see how these are built up.

In such a building as this I always feel that these difficult parts are best planned and finished off in quite separate units. In the case of the imposing window design on the main front, I have shown you how to make this, and then fasten it to the main building when ready. In such a case I would finish it right off, even to the painting and once the main structure here is built all you have to do is to take measurements on some cardboard and proceed to build to pattern. If you accomplish this then I assure you that making really interesting model buildings will hold no terrors in future. Later in this series I shall feature a super cinema which can be illuminated from inside.

The whole finish on the outside can be a matter for the individual to try his hand. When in town note the features of these modern buildings, and from this deduct your own ideas. I would suggest that the full range of Modelcraft papers would help you because I use these for all manner of jobs where you would not expect to find them. A full list of these will be found in the latest catalogue from this firm.

PASSENGER STOCK OF THE E.K.R.

(*Continued from page 403*)

They are quite easy to build. A normal bogie frame is assembled without the inclusion of the wheels. The latter are suspended on a frame cut from very thin brass sheet, as shown in Fig. 1. The wheels in actual practice, therefore, run on inside bearings, but this is not seen at all from the outside. In addition to free running, the coach is now sprung.

The bogies can be either fixed direct to the floor of the coach, or to cross members of the underframe. Finally, add the roof and remaining details—door handles, rails, ventilators, etc.

In recent articles I have described a method of shaping card for coach roofing by means of thinned acetate cement. This I have used and found satisfactory, mainly because no wetting of the card is involved. However, for those who are not experienced with moulding card, I should point out that by far the most common method of shaping it is to steam or soak in water, remove on to the template, fix down and allow to dry. One word of warning. As far as I can see this very simple method requires one condition satisfied. It requires a high quality card that will not peel off when soaked or steamed. It is as well to try the card before use, as so many fail in this respect.

Painting

This subject has been well covered in recent articles in this series. The original colours of the Pickering coach were, I believe, brown and cream. The window sill level was the dividing line, above being cream and below brown. I am not sure whether the E.K.R. ever repainted it during its period of active service, but when photographed it was grey, which suggests that it may have been used for track maintenance during the latter part of its life.

RADIO CONTROL

BY F. C. JUDD (G2BCX)

PART III. CONSTRUCTION OF THE RECEIVER

Foreword

THIS receiver has been designed for home construction and is based on the Ultraudion oscillator as a super-regenerative detector. An XFG1 valve is used with a relay in the anode circuit to effect control of selector or servo-mechanism. The receiver is quite small and light in weight (approx. 3½ oz.), and should be suitable for model aircraft as well as ships and boats.

Technical Description

The valve is used as a super-regenerative detector with a relay in the H.T. positive supply to the anode. A change in grid current causes a reduction in the amplitude of the quench oscillation, resulting in a decrease in the anode current. The signal from the transmitter produces the change in grid current in the first instance. The Hivac XFGI, *which is the only valve that may be used in this circuit,* is a gas filled "soft" valve. Hitherto, the life of such valves has been limited when used in circuits of this nature, but in this design the circuit constants have been modified to *increase the life-hours of the valve,* and for this reason, under no circumstances must the anode current exceed two milliamps. The *working* anode current for maximum life must be limited to between 1.5 and 1.8 milliamps. Under these conditions the valve should have a life of at least 30 to 40 hours (rated at continuous running). The actual life will depend on (a) the valve characteristics, (b) the careful adjustment of the circuit, (c) the working anode current, as above. The amplitude and frequency of the quench oscillation will also effect the life, since this controls, to some extent, the *peak* current during non-transmission periods.

Assembly

Cut and drill the paxolin panel (base) to the template (Fig. 2) of the assembly diagrams. Assemble the tag strips in the order shown, along with the tuning condensor, relay and solder tags under the fixing bolts of the tag strips B. (These are indicated in the diagram (Fig. 4). Tuning cond. assembly, etc., Fig. 3.

The tuning coil is wound from 16 s.w.g. wire (tinned copper), and is ½ in. in diameter and approximately 1¼ in. long. Wind on a former, such as a short length of ½ in. dowel, putting on three or four more turns than actually required. The number of turns on the finishel coil is eleven. When the coil is wound, slide it off the former and bend one end into shape to form the leg as shown in the diagram (Fig. 5), count off eleven turns and form the second leg on the last turn directly opposite the other. When the coil is pulled out all the turns should be clear of each other with about an inch space between the legs. Mount the coil as shown in the illustration (Fig. 4), cutting the legs back so that the ends may be bent over to form soldering lugs. The tuning condensor is soldered directly to these and prevents the coil falling back through the holes.

This completes assembly, but take great care when handling the relay which is mounted on the back of the panel. If you use the Flight Control FC 29 relay as specified take care not to undo the central screw at the base. A Siemens relay type 73, L85, may be used and there is just enough room to get this on the panel with a slight overlap at one end. These relays are mounted on an iron base which must be removed, leaving the relay on a paxolin base. This is mounted on the receiver base. Do not attempt to dismantle the relay from its paxolin base for reassembly on the receiver panel. You gain practically nothing in weight saving and stand a good chance of ruining the adjustment of the relay.

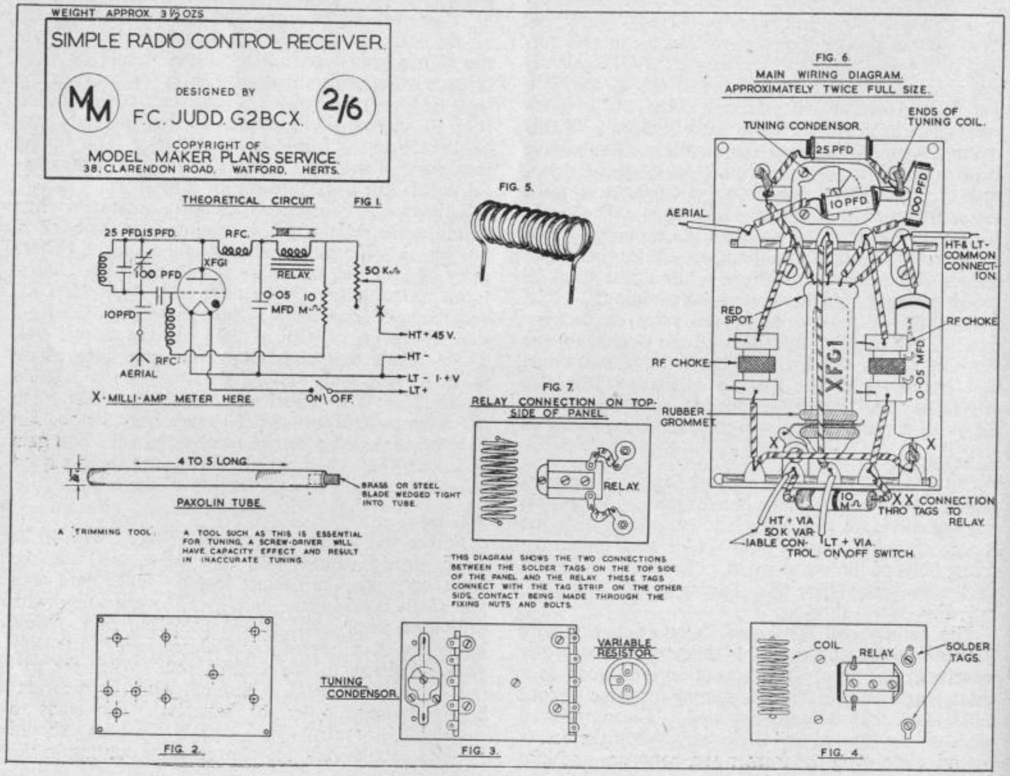
Wiring

Follow the wiring diagram carefully. Wire in 22 s.w.g. tinned copper wire and sleeve, and cut the wires only just the correct length. Take care with the small condensors, and avoid overheating with prolonged application of the soldering iron. Most important of all, *avoid dry soldered joints;* use only resin cored solder, and a clean iron. When the wiring is complete check it through with the diagrams before connecting up the batteries. The leads to the variable control (50K variable resistor) should be long enough only for convenient mounting in the model. The control itself should be mounted in some accessible part of the model at the side or top, and adjacent to the on/off switches and milliamp meter socket. (Wiring diagrams, Figs. 6 and 7.)

Testing

It is advisable to connect up and test the whole receiver on the bench, before attempt is made to instal in the model. In this way faults through wrong wiring, etc., may be more easily cleared. A 0-5 milliamp meter is connected in series with the H.T. positive lead as indicated in the installation diagrams. When connected up, switch on, and note the current reading on the meter. If it is above 2 milliamps reduce immediately to 1.5 milliamps with the variable control resistor. There should be a pale violet glow inside the valve which indicates that it is taking current and probably quenching. Switch on the transmitter and tune the receiver with it; when the tuning is "spot on", the receiver current should fall to almost zero. The transmitter should have all or at least half its aerial attached. (*No aerial on the receiver.*) Having checked the receiver for tuning and initial working test, the aerial may now be attached. Thin single covered wire should be used, and should be between 30 in. and 40 in. long. Solder one end to the aerial tag (indicated in the diagrams). On switching the receiver again (transmitter off), it may be found that the anode current has increased a little. Reset with the variable control to read 1.8 milliamps. With the transmitter on, but with no transmitter aerial on this time, check the tuning as before and note the current drop, which should be to zero or very near it. *Note this well. Tuning must be carried out only with a suitable trimming tool.* This may be made up from a short length of paxolin tube (¼ in. dia.) with a very short steel blade inserted at one end (see illustration).

Having completed the above checks a range test should be made. The receiver can be mounted, complete with its batteries, on a strip of wood and the whole carried off a few yards from the transmitter which must now have its aerial attached. The receiver aerial may be allowed to trail, but should be clear of the ground. Check the receiver current drop and if necessary retune (the transmitter frequency will shift slightly when the aerial is removed, and for this reason the transmitter frequency should be set with the aerial attached). Make the checks



with receiver every 25 to 50 yards until the limit of range is reached, generally in the neighbourhood of half a mile. These tests should be made in an open space as buildings are likely to effect radiation from the transmitting aerial. Since the characteristics of the XFG1 valve vary a little from valve to valve it may be found that a current drop to zero or at least half a milliamp is not forthcoming although the receiver tunes accurately (indicated by a small current drop).

Current drop only at short range, or a small current drop at, say, two or three hundred yards is sometimes due to too much gas in the valve. It will be necessary to run the valve for anything up to an hour or more in order to obtain greatest sensitivity. Leave the receiver running at 1.5 milliamps for half an hour and recheck with the transmitter. If the current drop is still not sufficient, run again for another half an hour and repeat the tuning and range check.

Once the range has been attained it will remain constant. Tuning will require checking only very occasionally as the circuit is quite stable, but both range and tuning should be checked when the receiver has been idle for any appreciable period. The relay setting should be made before installation in the model. It is set to close when the current falls below 1.5 to 1.6 milliamps, and opens again at 1.6 to 1.7 ma. Both the FC29 and type 73 relays will open and close over a current change of 0.2 of a milliamp. Handle the relay with great care.

The aerial finally used with the receiver will depend to some extent on the range required, and the model. For boats, a vertical "whip" type aerial may be used having a total length of 20 in. to 30 in. Thin brass tube is ideal for construction of a miniature "whip" aerial. On scale model ships the actual ship's aerial could be used providing the total length is as above and insulation from other parts of the ship and mast, etc., is good.

Fault Finding

The following are indications of faults on the receiver through wrong wiring and/or faulty components.

1. Faulty Valve. No current shown on the 0-5 ma. meter. It is just possible to see the filament of the valve glowing. A pale violet glow inside the valve is normal, but will be quite intense if the valve is not oscillating and therefore taking very high current. It must not be allowed to run in this condition for more than a few seconds.
2. Valve not oscillating. Indicating fault on tuning circuit or open circuit 0.05 mfd. condensor. Valve will take high current. Remarks in (1) apply. Check R.F. chokes.
3. Very low uncontrollable current. Valve quenching too hard. Try alteration of variable control. H.T. battery run down. Check also L.T. battery.
4. Current drop (with signal from transmitter) erratic and small. Aerial too long (should not exceed 40 in.). Try shorter aerial. Check tuning. Intermittent fault on valve, H.T. battery, or dry joint somewhere in the wiring.

Faults through wrong wiring and poor layout are more likely to occur than faults through defective components, but there is always the odd chance of a faulty valve or condensor, or even an open circuit choke. Probably the best and easiest method of deciding whether or not a component is faulty, is to replace it with another of the same value. The meter is a good indicator of the working condition of the receiver, and some simple tests may be made as follows: Check that the current can be varied between approx. zero and 2 milliamps, with the variable control. Touching the tuning coil will cause a rise in the anode current if the receiver is oscillating at 27 mc/s. This does not necessarily indicate quenching. A pair of headphones (high resistance) in series with the H.T. positive lead can be used to check quenching. A rushing noise, accompanied by a high-pitched whistle, will be heard. If the meter goes hard over (maximum reading) and the current is not controllable, a H.T. short circuit is indicated. Switch off immediately and investigate.

Once satisfied with bench and range tests the receiver may be installed in the model. It should be mounted on elastic bands attached to small hooks on the receiver base. This is particularly necessary in model aircraft and diesel driven boats where vibration is likely to effect the relay. Keep the battery leads together in a neat cable form. The aerial lead *must* be taken out to the main aerial by the shortest and most direct route, and should not run parallel with other wiring.

Methods of decoding, selector and servo mechanisms will be dealt with in another article.

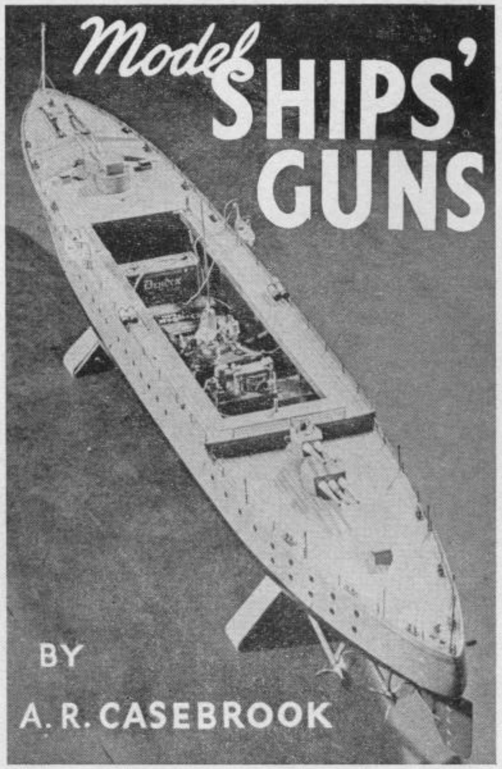
COMPONENTS FOR THE RECEIVER

	Component	Supply
1	Hivac Valve XFG1	Most model shops and makers
	Paxolin Panel	Radio shops and Flight Control
2	5-way tag strips	Flight Control
1	10 pfd. tuning condensor	Flight Control
1	25 pfd. ceramic condensor	Flight Control
1	10 pfd. ceramic condensor	Flight Control
1	100 pfd. ceramic condensor	Flight Control
1	0.05 mfd. paper condensor	Radio shops and Flight Control
1	10 meg. ohm. resistor, ¼-watt	Radio shops and Flight Control
2	Special 27 mc/s. R.F. chokes	Flight Control
1	50 K miniature variable resistor	Flight Control
1	FC 29 5000 ohm. relay	Flight Control
	or Seimens type 73 or L85 relay	Radio surplus stores and F/C
	16 swg wire approx. 1 yd.	Most Radio Shops and Flight Control
	22 swg wire and 2 mm. sleeve	Ditto
	6 BA nuts and bolts, rubber grommet for valve on/off switches, meter two-pin plug and socket type M2	Ditto
	0-5 milliamp meter	Radio surplus stores and Flight Control

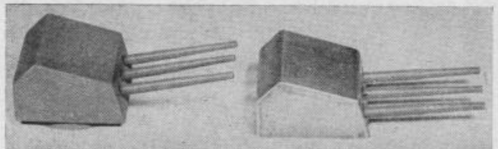
BATTERIES: For filament.—1.5 volts Eveready type, Pencell, U11, U12, etc.
For H.T.—45 volts max., 2 B122 (22½ volts each), for light weight or 45 volt deaf aid packs (Eveready)

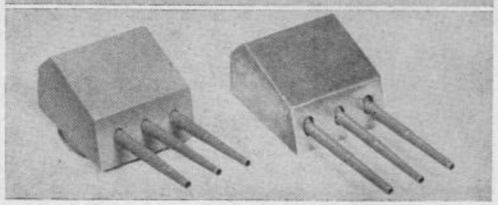
Model SHIPS' GUNS

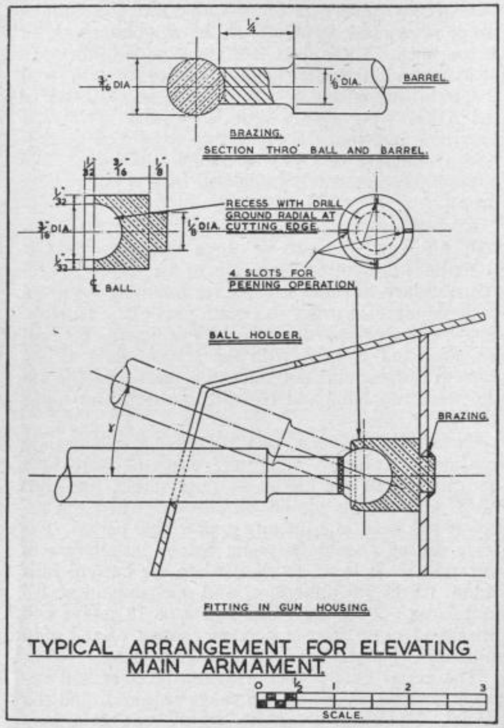
BY A. R. CASEBROOK



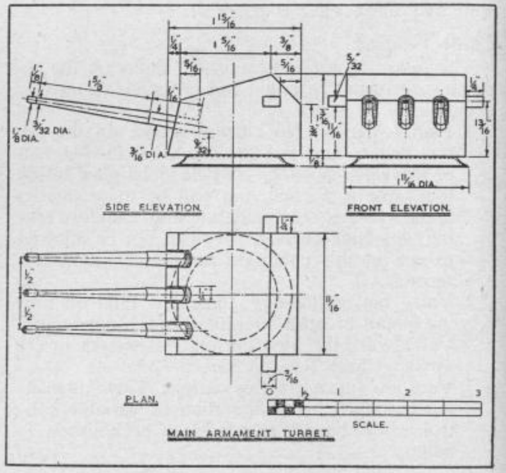
ONE of the most important items of a model ship is the deck fittings. In my opinion these can be the means of making or marring the whole appearance. In the case of model naval craft the leading feature is armament. With the high cost of these it can prove an expensive item. The construction of these in the home workshop is not too difficult and can be both fascinating and cheaper.



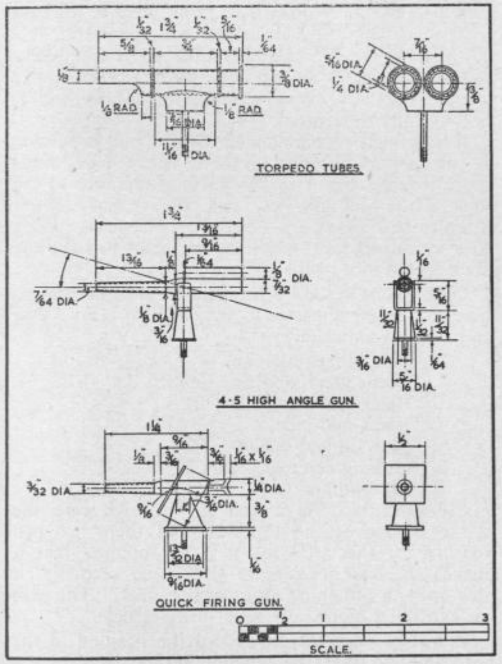




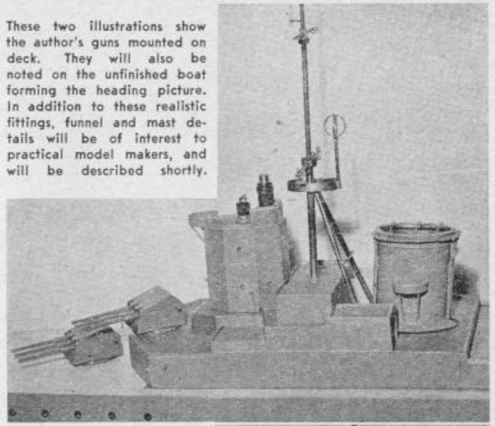
We will take the main armament first. There are two types to choose from, these being as follows: Gun house made of wood with fixed guns (bottom left), the only movement being the whole gun on a spindle; Gunhouse made of metal with guns to elevate and depress, and turn on a spindle (bottom left, right-hand illustrations). This type add realism to any model, and are well worth the time spent to construct.



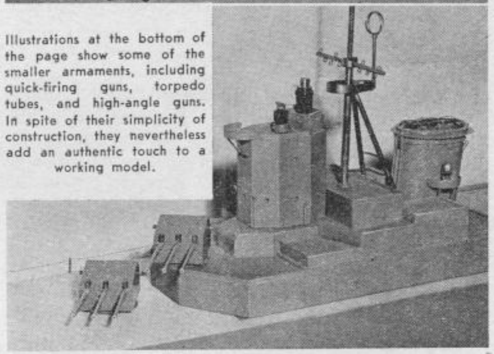
Very little need be said on construction, plans being self-explanatory. The wooden gun house is made from beech with guns turned from hard brass rod. These are fitted in gun house to a depth of a $\frac{1}{8}$ in. I would suggest at a slight angle to give the best appearance. Gun house is fitted to a base plate of wood or metal, and the complete model is mounted on the deck by a brass spindle turning in a bush. A small spring on the spindle, secured with washer and locking nuts, will provide movement tension.



These two illustrations show the author's guns mounted on deck. They will also be noted on the unfinished boat forming the heading picture. In addition to these realistic fittings, funnel and mast details will be of interest to practical model makers, and will be described shortly.

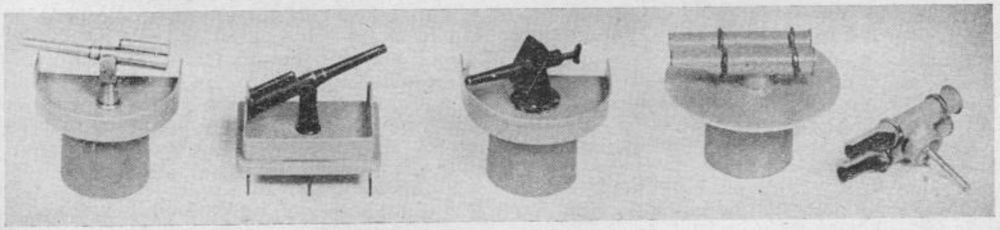


Illustrations at the bottom of the page show some of the smaller armaments, including quick-firing guns, torpedo tubes, and high-angle guns. In spite of their simplicity of construction, they nevertheless add an authentic touch to a working model.



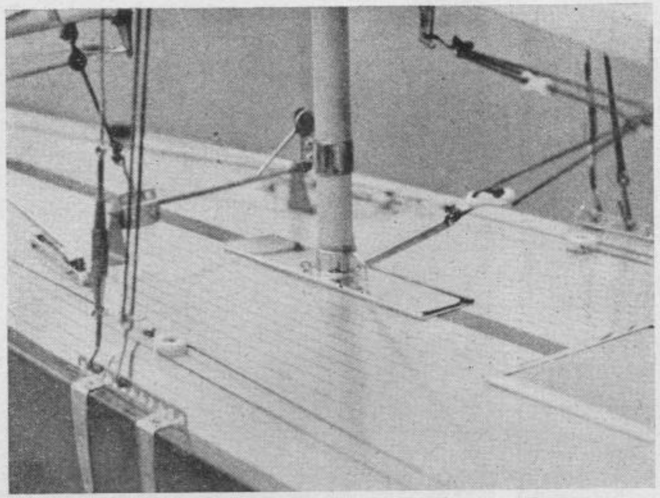
The metal gun house, made from thin brass or tinplate, guns hard brass. These are similarly mounted on deck.

Other armaments can include torpedo tubes, high angle guns, and a quick-firing gun. The tubes are of brass or copper, using a small washer or drawing pin for an end plate. Bands are of copper wire held in position with solder. The other accessories are of hard brass throughout, finished black, mounted on gun platforms with small spring and locking nuts. Blast bags for main armament can be made from the rubber teats of a doll's feeding bottle—which, when painted white, are very realistic.



10-RATER *Halceyon*

PART III. PAINTING & FINISHING THE HULL



JOHN LEWIS'S "HALCEYON" HAS NOW HAD TWO WINS IN TWO OUTINGS, BEATING SOME OF THE BEST IN THE MIDLANDS, WITH HIGH POINTS ON BOTH LEE AND WEATHER BERTHS.

IT has been mentioned that a good, smooth, finish is very desirable on a boat in order to reduce the sheer friction. A good finish is not difficult to obtain and only requires a little more than average patience. It is necessary, of course, to obtain the smoothest possible surface on the hull before starting to paint, and any blemishes or dents can be filled up with cellulose stoppers. This is a grey plastic which sets very hard quite quickly, but remember that as we shall be using an oil-bound paint, it is not advisable to use cellulose stoppers after any paint has been applied.

The hull is first treated with two coats of varnish thinned down with genuine turpentine; this soaks into the wood, making a good primer. Rub the hull down lightly with fine glasspaper and we are ready for building up the coats of paint. However, before applying any paint it is well to test the hull for correct flotation, so that trimming of the lead, necessary to correct errors in the L.W.L. or fore and aft trim, can be made.

Float the hull in a suitable bath or pond, and place on the deck weights equivalent to the masts, sails, fittings and vane, etc. For this initial check the following weights will prove near enough : 1¾ lb. over the mast stip ; ¼ lb. 4 in. aft of the rudder post (the rudder should be in position), and 1¼ lb. midships, this latter weight being the allowance for deck fittings and paint.

Make sure that the hull has not taken up a list, and as one of the joints coincides with the L.W.L. it will be obvious if the trim needs adjusting. Do not be misled by the meniscus of the water up the sides of the hull, as this gives the impression that she is floating too low. This is particularly noticeable under the overhangs where the hull leaves the water at a fine angle. If the trim looks right over the middle two-thirds of the hull, then that is near enough at this stage. Using the above method as a check, the prototype finally measured, for rating purposes, 51.92 in. on the L.W.L. as against the designed 52 in. I believe this to be as accurate as is necessary, and as a point of interest no adjustment to the lead as designed, was required.

Carry out the above test quickly and wipe off all surplus water when completed, as the hull is not yet fully waterproof.

It is strongly recommended that the hull is painted in two colours, meeting on the L.W.L. This means more trouble, but it makes all the difference to the look of the final job. A "one colour" boat always tends to look heavy and ungainly. The same applies to a varnished hull, which never seems to have the slick appearance of the painted boat.

Colour schemes are a problem to some people, so here are a few suggestions which have been found to look very satisfactory : —

1. Pale blue and cream.
2. Bottle green and Eau de nil.
3. Black and cream.
4. Black and jade.
5. Maroon and cream.
6. Grass green and cream.
7. Maroon and grey.

My favourites are 2 and 5. In each case the darker colour is the topsides, and there are two reasons for this. Firstly, it is my opinion that it makes the boat look more sleek, and secondly, it ties up with obtaining an attractive deck. This will be explained more fully later in the article.

It will be necessary to record the position of the waterline, so that the junction of the two colours will be in the correct place. This is easily done by measuring the distance from the gunwale, round the surface of the hull to the L.W.L. at intervals of about 3 in., and keeping a note of the dimensions.

The hull should now be given a coat of good quality lead paint, this being rubbed down smooth with glass paper. Several coats of flat undercoat paint are now applied, and after each coat the hull is well rubbed down using fine "wet or dry" paper. This is a carborundum abrasive paper and is used wet. One of the secrets of a good finish is keeping the work really wet with water during rubbing down, and as soon as any hard particles are felt to be grinding into the surface, the paper should be well washed out or thrown away. Do not be satisfied until a really good surface is obtained, and providing the rubbing down is done thoroughly and the paint applied in thin coats, anything up to eight coats can be put on.

It is important that the paint is allowed to be quite dry before rubbing down ; it is fortunate that undercoating usually dries quite quickly, and 48 hours is an adequate time to allow, providing the paint is applied thinly.

When a satisfactory finish has been obtained the waterline can be marked out and the first coat of finishing enamel applied. It is usually more convenient to paint the bottom of the hull first, particularly so if it is the lighter colour as previously suggested. In order to ensure a firm line between the two colours, marking tape must be used. I find that Sellotape ⅜ in. wide is quite suitable, but care must be taken that the paint to which it is stuck is thoroughly dry and hard, or it has the tendency to pull the paint off when removed.

The marking tape should be removed immediately after the paint has been put on, thus preventing a ridge from building up at the junction of the colours. When dry, the first coat of enamel may be rubbed down with the finest grade of "wet or dry" paper, or with a wet cloth pad, and powdered pumice. If all goes well, the last coat should give a finish completely free of brush marks and with a high gloss.

To obtain the very best results it is, of course, necessary to use only the finest quality materials. A good brush is difficult to obtain, and once one has one that is satisfactory, it is well worth looking after. I find that a ¾ in. brush is about the right size for the job, and I use one particular one for all finishing work, cleaning it out after each time it is used, and again before resuming it, to ensure that it is free from bits of old paint or dirt and dust.

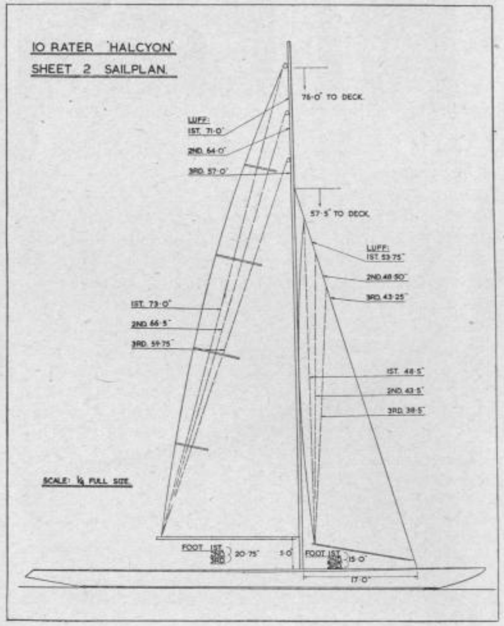
Providing the enamel is of a first class make, and that the undercoating recommended by the manufacturers is used, a good job should be the result. Unless a special Marine enamel is purchased, it is well to make sure that the enamel is suitable for exterior or for interior use.

The undercoating need only be of the colour suitable for the lighter finishing coat, and can therefore be used over the whole hull surface, so effecting some economy. Two coats of finishing enamel are quite adequate to cover up the lighter undercoat.

Enamel requires to be brushed on with considerable care, as it must be of sufficient thickness for the brush marks to fill out and yet not to form runs on the surface. It is probably easiest to brush in the opposite direction from that which you are painting. This means that the enamel is laid on to the surface and then brushed back on to the work that has already been covered. With practice, a surface completely free of brush marks can be obtained by this method.

Temperature has quite an important bearing on the quality of finish obtainable, and in order to achieve the best results, the room in which the work is done should be at about 70 deg Fahr. It is a waste of time trying to do good work in a cold workshop on a winter's evening, and I find it necessary to annex a spare bedroom for this work, making sure that no one enters until the paint is dry. Remember that the hull, the paint and the room, should all be at about the same temperature.

The deck is finished in the same manner as the hull as far as obtaining a smooth surface with undercoating, and can be done together with the hull if arrangements are made to hang the boat up, thus saving a lot of time. Give the decks two coats of cream enamel and rub down the last coat with a very fine "wet or dry" paper to a perfectly smooth and matt surface. It is now necessary to line the deck to represent planking, there being two systems and methods of doing this.



The first system is with the lines running straight fore and aft, parallel to the centre line; the second being with the lines running parallel with the gunwale and meeting on a kingplank down the centre line. The second system is much preferable and is in fact of the best yacht building practice.

The lines are put on with the draughtsman's ruling pen and black Indian ink. Some recommend that a holder for the pen rather like a marking gauge is used, the gauge being run along the deck edge for a guide. Personally I prefer to make a template of 1/8 in. obechi, and use the pen in the normal way round its edge. The procedure is first to rule two parallel lines 1/2 in. apart down the centre of the deck to form the king plank, and then with the aid of the template start ruling in the planking, working from the gunwale towards the king plank. The lines are spaced about 1/4 in. apart, and with a little practice it will not be necessary to measure the spacing each time. When one half of the deck is lined out put a pencil spot on the edge of the king plank corresponding to the termination of each line; this is to ensure that the planks on each side of the deck come opposite to each other.

Take care not to smudge the lines for it is not possible to rectify a mistake without cleaning off the whole deck and starting fresh with another coat of cream enamel. As soon as the ink is dry, the deck should be given a very thin coat of varnish. Thin the varnish with about 10 per cent turpentine and add just a spot of terebine driers. This will fix the lining, dry rapidly and leave a good gloss surface. The colour will change slightly from cream to a stone colour which is quite attractive and acceptable.

The deck edge and the king plank should be painted the same colour as the topside. If the topsides are of a darker shade, the general effect is very pleasing. It is risky to use marking tape on the deck as too much work is spoilt if the varnish lifts off as it is removed. I had it happen once, and since then always go round gunwale and king plank freehand. It usually takes about two hours, by which time I am trembling like a leaf and have become quite boss-eyed! The brush used for this purpose is a chisel shaped, 1/4 in. wide, best quality camel hair.

If care has been taken the boat should have a finish as good as a new *pre*-war car body. A small point which I think is worth mentioning here is that the turning pole, used when sailing the boat, should have a soft sponge rubber sleeve as a lot of damage can be done to the finish if the pole is not well protected.

During the painting process a lot of time is spent waiting for the paint to dry, and if the work can be done in a spare room it is possible to get on with making the masts and spars and some of the fittings.

READERS ARE REFERRED TO OUR PLANS SERVICE ADVERTISEMENT (FRONT OF THIS ISSUE) GIVING DETAILS OF DRAWINGS FOR THE 10-RATER "HALCEYON".

MODEL YACHT CLUB NOTES

BY "COMMODORE"

WE are happy to report that more clubs are sending in details of their activities, together with results of club events. It would give an added interest to such reports if Press Secretaries would make a point of including registration numbers as well as names in the results.

Still more club news will continue to be welcome. We also await volunteers from Scottish clubs to report their two National events.

Birmingham Model Yacht Club

The fifteenth annual Thornton Trophy took place at Watton-Lakes on April 19th, when twelve 10-raters came under starter's orders. Racing commenced in brilliant sunshine with yachts carrying full canvas and making excellent heats. A freak storm suddenly descended and gave skippers the harassing work of reducing sail in windward boards, and the use of pocket-sized spinnakers for the runs were in evidence. Competition proved keen, with some close finishes by the leading craft. Heavy weather forced the retirement of two yachts owing to gear being broken and carried away. Dr. P. Thornton, donor of the trophy attended the meeting, together with Midland District Committee officials, and Miss Linnet Pitt, who presented trophy and prizes.

Results were as follows :—

	pts.		pts.
1. *Halceyon*—J. Lewis	39	6. *Dolly Grey II* —D. Lippett	24
2. *Opal*—J. Drury	39	7. *Beatrice*—H. Bach	17
3. *Cunior*—F. Pitt	29	8. *Samphire* —M. Brueton	10
4. *Jill*—E. Locks	26	9. *Dolphin*—G. Brown	7
5. *Flook*—J. Meir	26	10. *Valkyrie*—E. Mills	3

Lady Gay (J. Penn) and *Seagull* (J. Bradnock) retired.

We are glad to report this success by John Lewis, who is to be congratulated for his fine sailing, and excellent design—the latter can at any rate be shared by readers, for his 10-rater *Halceyon* is now being published in *Model Maker*.

Fleetwood M.Y. & P.B.C.

Fleetwood A. Class yachts opened the club's 1952 season on Good Friday with the Hayes Trophy, sailing in eleven heats. Light south to south-west winds prevailed throughout the day causing some trouble to competitors due to the promenade buildings obstructing the wind at the west end. Racing was, nevertheless, close and exciting, with inches between the yachts on several occasions which added to the enjoyment of the large holiday crowd. A further round was sailed before lunch on the Saturday, but a dearth of wind by 4 p.m. made it necessary to declare a result on the first round only. This gave a closer finish to a Cup Race than the club has known for a long time, only eight points separating the first six places. Leading scores were :—

	pts.
1. *Scamp*—L. K. Corooin	38
2. *Westwind*—R. Pilling	36
3. *Flame*—E. L. Dawson	35
4. *Windward*—Miss J. Rawlinson	34

Birkenhead M.Y. & P.B.C.

We were glad to hear from Commodore A. R. Andrews with a fixture list and some statistics on last season's successes by the club. Most notable honour was, of course, their Mr. W. H. Jones' selection to represent the M.Y.A. at Boston, in company with Mr. R. Jurd, of Gosport—a north/south combination which, though it failed to prove victorious, did much to promote Anglo-American sporting friendship. In National Events members collected 3rd in A Class, 2nd in 10-rater, and 1st and 2nd in 36 in. Restricted Class, which was sailed on their home water. In Northern District Committee events they took 1st and 2nd places in A Class, 10-rater and Marblehead, and 1st in *Daily Despatch* Cup Open Event at Fleetwood, plus a number of other worthy successes.

This seems a good list for one club—certainly more than their share—and Commodore Andrew assures us members are all out to do even better this year.

Hove & Brighton M.Y.C.

The club is now going forward with a full fixture list after a somewhat unfortunate start to the season when their first two events had to be cancelled owing to repairs to the Lagoon. We hope these will make sailing at this popular Sussex venue even more pleasant than in the past.

Poole Model Yacht Club

The new boathouse has now been officially opened by Mrs. Simpson, wife of the Commodore. All that is now needed to complete amenities is the catwalk enclosure. The opening ceremony was followed by a 36 in. restricted class event: 1st *Teal* (an omen which we trust members were quick to follow in the Grand National!), Mr. Keach; 2nd *Blue Comet*, P. Rogers; 3rd *Whisper*, B. Sanson. Marbleheads raced on 20th April: 1st *Marconi*, J. Horton; 2nd *Pila*, J. Jones, and 3rd *Gobroon*, D. Spicer.

Our old friend Lt.-Col. Bowden has also recently given a demonstration of radio controlled boats on the club water, accompanied by Mr. Leigh. In view of the Colonel's advanced ideas on sail design we have always been sorry that class racing has not attracted his interest, though perhaps this is because he is lucky enough to have a full-sized tiller in his hand on most summer sailing occasions.

Paignton M.Y.C.

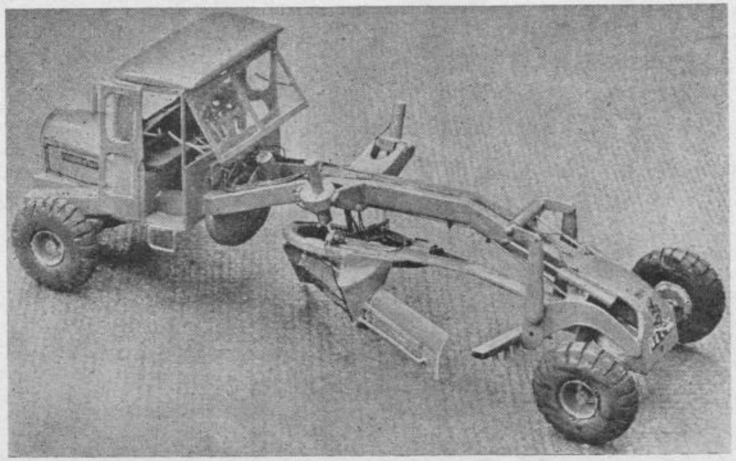
The club's summer season opened on April 6th with the Royal Torbay Yacht Club's Silver Rose Bowl event for 10-raters. Fourteen yachts faced the starter from the home club supported by entries from Bristol and Exeter. A third suit breeze was blowing for the first heats, but within half an hour top suits were the wear, until the end of the event when wind completely failed. Commodore Pinsent was in great form, not dropping a point until the last heat or two. Results :—

1. *Trixie*—D. Pinsent, Paignton	45
2. *Semper Fidelis*—H. Isaacs, Exeter	41
3. *Rose of Devon*—R. Eland, Exeter	35

Semper Fidelis has only just been launched, built from a Littlejohn's design, and this must be almost its first appearance amongst the winners. *Rose of Devon* is also a comparative newcomer, being launched last year from the unpublished lines of a design by the late W. H. Davey of Bournville, to whom John Lewis of *Halceyon* owes much of his designing skill. *Trixie*, of course, is a well-tried favourite, and though—as can be seen—far from outclassed in this new company may be retired at the end of this season in favour of a more modern boat if the skipper's eye falls on a design worthy to be her successor.

Amongst visitors at the Rose Bowl event the club were particularly happy to welcome Mr. Windcart, Rear Commodore of the R.T.Y.C., well-known as a great West Solent helmsman.

AVELING AUSTIN MOTOR GRADER



B. E. G. CLARK PRESENTS A MOST UNUSUAL MODEL IN THE SHAPE OF THE AUSTIN AVELING MOTOR GRADER. NOTE IN PARTICULAR THAT THE "FRONT IS AT THE BACK" WITH THIS REAR ENGINED SPECIAL PURPOSE VEHICLE.

A FEW words about graders and the work they have to do might be of general interest.

Generally speaking, graders are responsible for the levelling and preparation of road and runway surfaces (to quote two instances), immediately prior to final surfacing. They may also be used for clearing spoil off roads and paths, and owing to the wide range of horizontal and vertical angles at which the blade may be set, they may also be used for cutting the slope to earth banks. The type of grader chosen for the model is an Aveling-Austin, one of the latest British built graders which, in addition to being able to carry out all the above operations, is fitted with a scarifying attachment for breaking up road surfaces. It may also be fitted with a loading attachment of the elevator type, snow plough or a bull- or angle-dozing blade at the front end, the operation of all these additions being hydraulic. The engine is a six-cylinder Leyland diesel of 7.4 litres.

Now for the model itself. It was built entirely without the aid of power tools, and is constructed of wood, card and wire only, the model shown having over 200 separate parts. A number of these could, however, be omitted without detracting from the final appearance. For example, it is not uncommon for the scarifying attachment to be taken off a grader when not in use, and also the whole of the enclosed cab, the finished line of open driver's cab being shown in the exploded sketch.

The logical point at which to start this model is, I consider, the chassis (1). This is far and away the most difficult part as it is absolutely essential that the members be at the correct angles to one another, and also that there be no twist. Further, as the whole model has to be assembled about this chassis it must be as strong as possible. For these reasons it was cut from a solid block of close grained pine with a coping saw. The block (2) for mounting the radiator was then fitted. Being solid this prevented the accidental breakage of the two protruding arms of the chassis. It is a good idea to get this piece made and in position at the earliest opportunity. The radiator was carved from the solid, recessed and paper stone grilles fitted, together with the front plate (3) of stiff card. The bumper bar of rounded wood was one of the last pieces to be made and fitted, again with the view of preventing possible breakage. The bonnet was made of card and moulded to the correct radius. The central strut from radiator to cab was inserted for strength only and is optional.

The floor and cab sides and seat may be done at this stage. The floor (5) was made in one piece, recessed and bent up as shown in the exploded drawing to fit the chassis. There is very little need of explanation as regards the cab sides. A word of warning here might be advisable. If it is proposed to fit the enclosed cab and doors, it is best to build the upper part of the cab separately to match the lower portion, but not attaching the top until the interior cab deails are fitted and painted. In addition to being the easier, it is the more correct procedure as the whole top and sides (above the half way mark) may be removed in one piece in the actual grader. With this method the correct effect is achieved. The roof is incidentally carved from solid to the correct shape and radii.

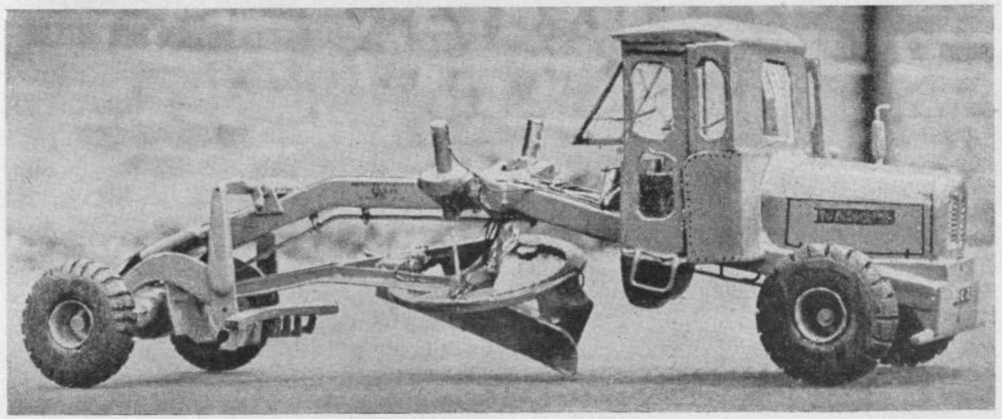
The gearbox (8) is next fitted, together with the supports for the pistons and cylinders (10) controlling the vertical angle of the blade and circle, these latter items being quite simply built up of card and dowel of a suitable size. The stiffening plate (12) at the front end to which the front axle is eventually attached, may now be fitted, together with the back plate (11). Both these pieces are heavy gauge steel plates in practice, but may be faithfully reproduced in thick card.

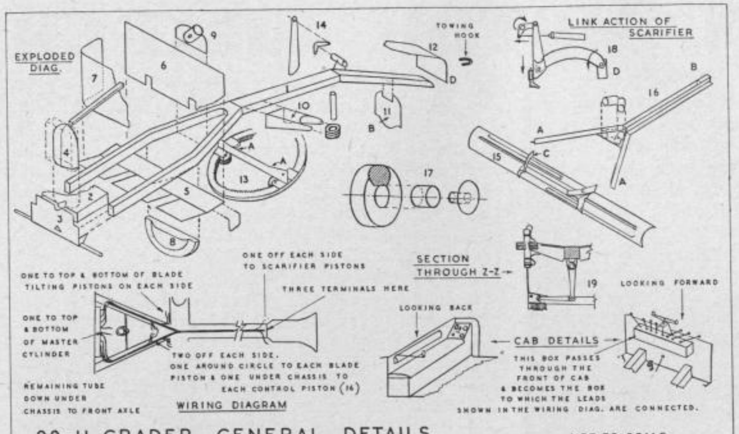
If it has been decided to fit the scarifying attachment, now is the time, the whole unit again card and dowel assembled as shown. The link action sketch explains the action of this unit and will probably assist would-be modellers with the assembly and construction. The holder for the actual scarifying blades was shaped to the required curve in mm. ply with a fretsaw, the blades being later cut from card and simply glued in position. The vertical member to which the scarifier is attached is in actual practice a sheet steel pressing. The best way to represent this is to carve the convex portion in wood and glue it to a previously cut flat card member of the shape shown.

The axles must next be made and placed in position, in order that the propeller shaft may be fitted. If the propeller shaft is not made and assembled before the blade and circle are fixed it becomes a well nigh impossible task (as I learnt to my cost). The propeller shaft is a single length of wire, the bearings being triangles of card. The universals were omitted. There is no form of suspension on the axles, the front being pivoted between plates 11 and 12, and the rear being mounted directly on the chassis through two small brackets. The axles were carved from the solid and are comparatively easy to fit. The point to watch here is that the axles are fitted so that when their centres are equidistant from the ground the centre portion of the chassis containing the circle support arms is horizontal to the ground. The prop.-shaft to the front axle follows the line of the chassis through differentials and support bearings as shown, to the top of the gearbox (8). The shaft to the rear axle goes direct from the bottom of this gearbox.

The circle and blade can now be made. The circue is cut from mm. ply and notched around the inside with a triangular needle file to represent teeth, the other fittings being again made of card and scraps of wood. The construction and assembly can be easily followed with reference to the general detail sketches. Having cut out the circle, fit the cross member and small brackets to hold the four support cog wheels (13 refers). (16) consists of two L-girders placed back to back and bent to a Y, and fitted with the fillet and spacing block as shown. This Y can be glued to the circle. The points A on the Y connection to the points A on the circle cross member, the point B on the Y will eventually be fitted to the point B on (11). The blade, again made of card, and moulded to the required curve, together with the side shift cylinders and piston rods need no explanation, but the blade circle attachment brackets have not only to fix round the outer edge of the circle but also have to be flat and tangential to the circle at the back of the blade. The best way to overcome this is to glue two rectangular pieces of thin card to the circle in the necessary places for the required blade position, and when the glue is set work the back of these brackets to the right position and shape. When satisfied, cut the front face of these pieces to the curve of the blade, and the back edge to the required taper. The blade may now be glued to these plates, the cylinders and pistons attached, and the circle and blade assembly fixed in the following manner. Point B of the Y to point B on (11), the piston rods of wire through the ends of the circle cross member and into the end of the vertical cylinders, the central supporting pivot connection shown in (19) made of card and connected after the whole unit has set.

Cab and wiring details are shown in the accompanying sketches, and need no further explanation beyond the following: that there are 16 hydraulic





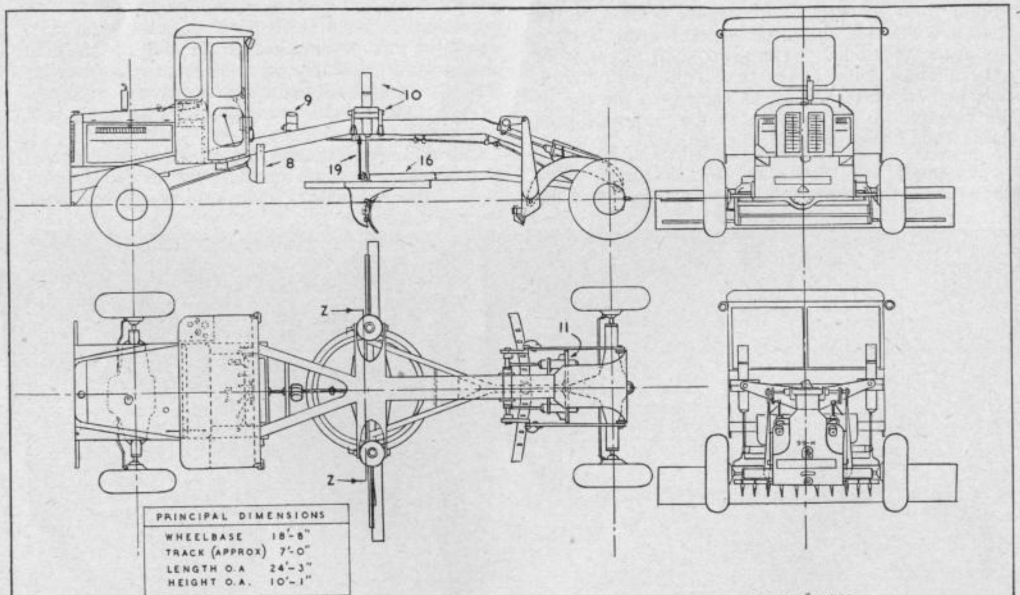
99-H GRADER. GENERAL DETAILS

connection hoses, eight top and eight bottom, from the central box, with distribution as indicated. These may best be represented by dark brown cotton glued along the chassis to the appropriate parts. The control levers were made of ordinary pins inserted to the right length and angle with their heads painted black to represent ebonite.

The wheels were made as follows (17 refers). The tyre was cut from flat wood strip and then shaped to the correct section, the tread being filed on with a needle file, bearing in mind that the tyres are of the heavy duty type and have a very pronounced tread. A roll of paper was inserted through the tyre to form the rim. The brake drum was cut from thick card, and a small cylinder of $\frac{1}{8}$ in. dowel, for the hub, glued centrally on it, the whole being fastened to the rear of the wheel.

The small, but important fittings such as the exhaust pipe and radiator cap are made from scraps of material, and are fitted last of all. The seat upholstery is from dark brown leather.

These graders are cellulosed red throughout, and this colour was adopted for the model. The metal shafts and piston connecting rods were left in natural bright metal, and the cogs on the circle were black, as were the tyres, Indian ink giving a very good matt finish for these parts.



PRINCIPAL DIMENSIONS	
WHEELBASE	18'-8"
TRACK (APPROX)	7'-0"
LENGTH O.A	24'-3"
HEIGHT O.A.	10'-1"

AVELING-AUSTIN TYPE 99-H MOTOR GRADER

A DUTCH AUXILIARY

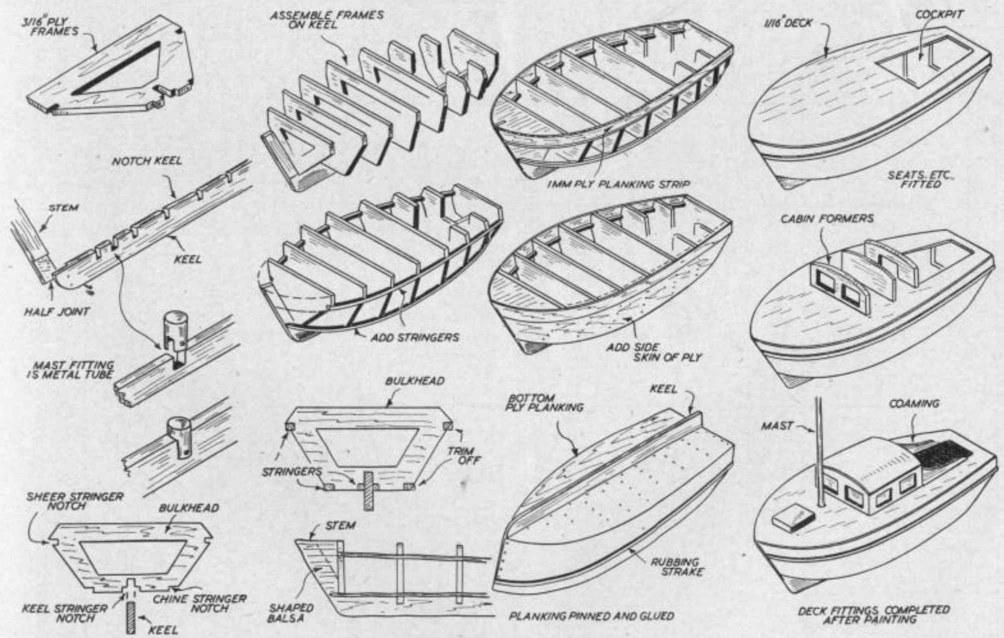
THOUGH ONE OF THE MORE ATTRACTIVE PROTOTYPES THE AUXILIARY HAS BEEN SOMEWHAT NEGLECTED BY MODEL MAKERS WHO WILL WE HOPE DISCOVER A NEW INTEREST IN THIS FASCINATING DESIGN TO A SCALE OF APPROXIMATELY ONE INCH TO THE FOOT DESCRIBED IN DETAIL BY A. M. COLBRIDGE

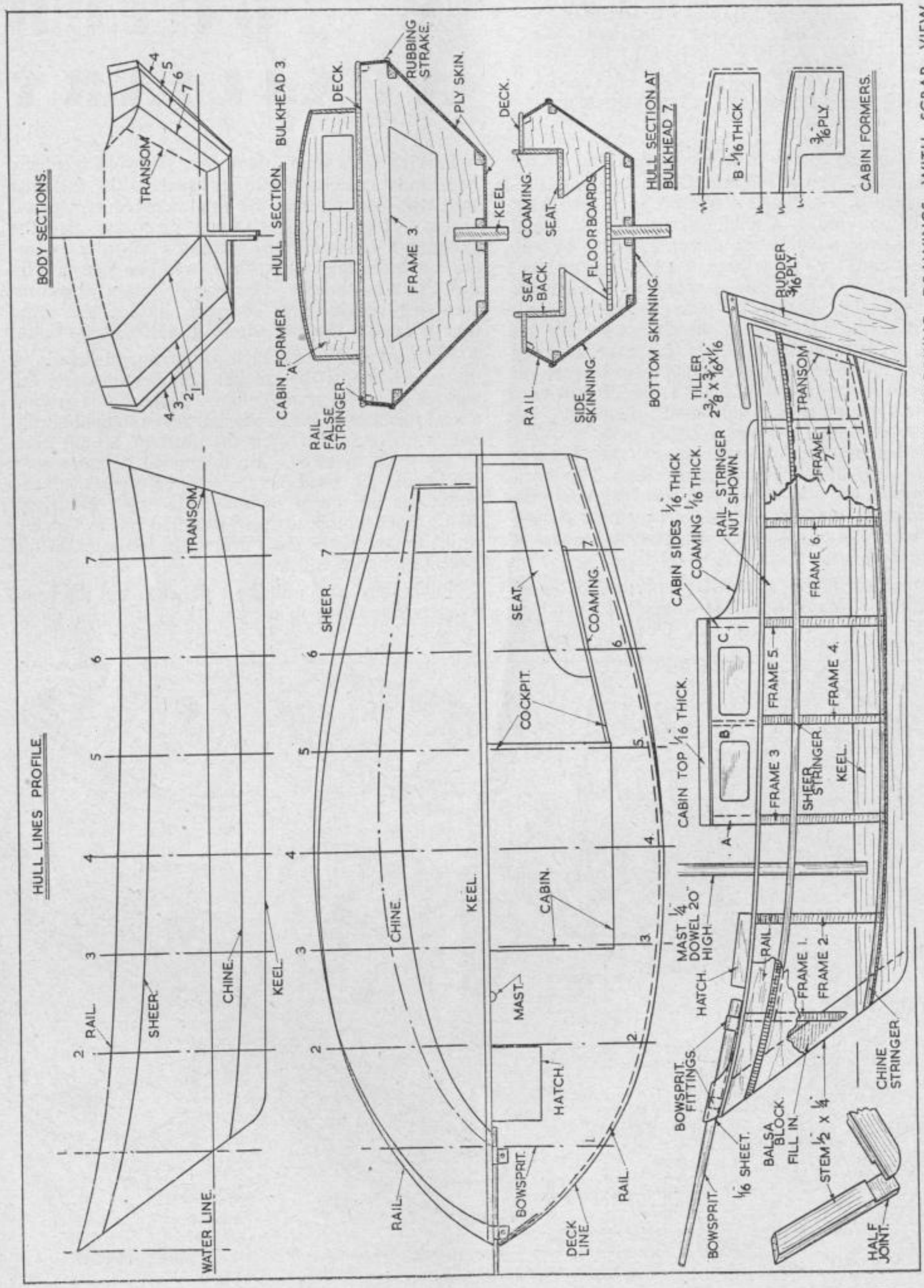
THIS is a very pretty little model designed on the lines of a typical full-size Dutch auxiliary, representative of a scale of roughly 1 in. to the foot. It can be powered by a small electric or $\frac{1}{2}$ c.c. diesel motor, or even a clockwork motor, and also by sail. The latter calls for the addition of a keelboard which, in the case of the model, is made as a separate, detachable unit, bolted in place when required. There is plenty of scope in the design for the inclusion of detailed fittings, and for experimenting with different forms of power units. No power unit installation is shown on the plans as details will vary with the type of power unit used. However, the open cockpit offers a space roughly 6 in. x 4 in., which is ample room for installing any type of power unit, once the hull has been completed. The stern tube is about the only tricky part and for preference this should be mounted in the keel member during the initial stages of assembly, if a powered model is contemplated.

Construction is on somewhat unorthodox lines, using thin ply skinning instead of regular planking, or carving from solid. However, the work has been kept quite straightforward, assisted by the fact that this type of hull has the minimum of compound curves. It goes without saying, of course, that the skinning must be applied accurately in order to produce a watertight hull, which was one reason why thin ply was chosen. Plywood of 1 mm. thickness possesses considerable strength, but at the same time is readily cut and trimmed with a sharp knife.

The plan shows the main outlines and details of the vessel, whilst the smaller sketches illustrate the various stages in construction. Assembly is around a keel member, $\frac{1}{4}$ in. thick, and seven individual ply bulkheads or frames, plus the transom, all cut from $\frac{3}{16}$ in. thick material. Resin-bonded "waterproof" ply should be used here. Outline shapes of the bulkheads are given by the body sections on the plan. Each bulkhead can be fretted out to lighten, whilst bulkheads 6 and 7 are cut as indicated in the typical hull section drawing.

Notches are cut in all the bulkheads and the transom corresponding to the keel, keel stringers, chine





THIS DRAWING IS EXACTLY ONE-THIRD FULL SIZE AND MAY BE SCALED UP. FULL SIZE WORKING DRAWINGS WITH SCRAP VIEW PROGRESS SKETCHES ARE AVAILABLE FROM MODEL MAKER PLANS SERVICE, 38 CLARENDON ROAD, WATFORD, HERTS. PRICE 3/6 POST FREE

stringers and sheer stringers. Keel notches are $\frac{1}{4}$ in. wide and match with the notches also cut in the keel member. Keel stringers are $\frac{3}{16}$ in. square. Chine and sheer stringers are $\frac{1}{4}$ in. x $\frac{3}{16}$ in., subsequently chamfered off to conform to the lines of the hull sections and lie flush with the outer surface of each bulkhead. All notches must be cut as accurately as possible.

The keel member is cut from $\frac{1}{4}$ in. hardwood, and is half jointed to the raked stem, also cut from $\frac{1}{4}$ in. stock. Glue and screw this assembly. All the bulkheads or frames and the transom are then assembled accurately on the keel, checking that they are square and correctly lined up. The two sheer stringers should then be cemented in place when the assembly can again be checked for trueness. Chine stringers and keel stringers are added to complete the first stage of the assembly. When set, chamfer off the chine and sheer stringers to conform to the shape of the individual frames.

The extreme bow should now be filled in with balsa block forward of bulkhead 1. Templates of this shape should be used to ensure an accurate carving job as the planking rests on top of it.

The two rail strips can now be fitted, cut from 1 mm. plywood. These can be cut to shape by trial and error, or a wide strip used, trimmed to shape after assembly. Pin and glue to each frame, and to the stem and transom. The main side skinning, also of 1 mm. ply, is then secured in a similar fashion, after which the hull can be turned upside down and the bottom skinning added. Probably the easiest way to do this is to trim the top of the side planking to the shape of the sheer line and secure in place. Then trim off flush with the bottom of the chine stringer. The bottom planking, just a rectangle of ply, is then secured in place and trimmed down when set. All the joints must be sound.

The rail then needs backing up flush with the deck line between formers. This could have been done initially by notching rail stringers into the frames at the first stage of assembly, but the compound curve involved would make this rather a tricky operation. It will be just as effective, and much easier, if false stringers are added after assembly, trimmed to fit against the top of the rail when glued between the individual frames. The main point of these false stringers is to provide a good glue-down surface for the deck where it meets the top of the rail. The false stringers are trimmed down flush with the top of the rail.

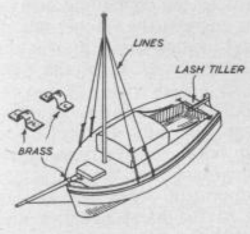
A rubbing strake should be attached to the outside of the hull over the joint line between the rail and side planking panels. Thin stripwood can be used for this, but would require notching to fit. A very good solution is to use leather strip, tacked in place at intervals of 1 in. or so. Plastic strip (braiding) is another alternative, but if this is used it should not be secured until after the final paint job has been applied.

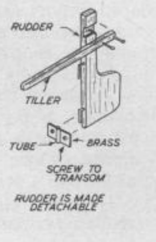
The deck is cut from $\frac{1}{16}$ in. hardwood — good straight-grained stock which will bend to the required curve. The deck itself is flat laterally and so no difficulty should be experienced in making the bend. Check the deck for fit, making sure that all the frames are flush with the rail line and the whole deck seats down properly. Before fastening in position, however, attend to the necessary interior hull details.

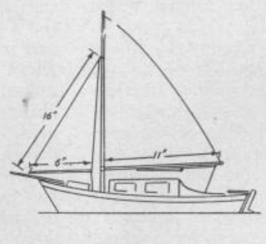
It will be necessary to fit a socket for the mast which is simply a short length of $\frac{1}{4}$ in. internal diameter metal tube, slotted for about half its length to fit over the keel. This fitting engages in a notch in the keel and is screwed or bolted in place. If any interior cabin detail is required, this should also be added at this stage between Frames 3 and 5. In this case the cabin platform is cut out of the deck itself. Otherwise, if the cabin is to be purely "dummy" the deck can extend uninterrupted back to the cockpit. Before fitting the deck, too, give the whole of the interior of the hull several coats of shellac or similar varnish to waterproof. Check all the joints for watertightness.

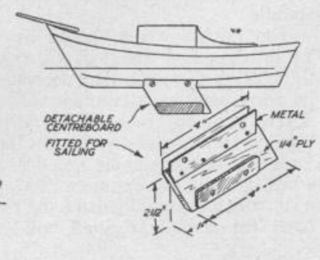
The deck is attached by glueing and pinning to the frames, and glueing to the rail and rail stringers. Start by pinning down on Frame 4 and working fore and aft from this point. The deck should slightly overlap the rail all round, and can be made oversize in the first place, trimmed down to the required shape afterwards. In other words the deck can be applied as a rectangular sheet of $\frac{1}{16}$ in. material with just the cockpit fretted out.

The three cabin formers are glued directly to the deck in their correct positions, when the cabin sides and cabin top can be added. The windows should be covered on the inside with panels of thin celluloid before fitting the cabin roof. Cockpit details are completed by the addition of the seats, etc., and a









suitable flooring of $\frac{1}{16}$ in. hardwood, secured between the frames. The for'ard hatch is cut from $\frac{3}{16}$ in. material and glued to the deck. The mast is a 20 in. length of $\frac{1}{4}$ in. dia. dowel, tapered towards the top to roughly $\frac{1}{8}$ in. diameter. A suitable hardwood cap can be fitted, if desired. The mast is made detachable for transport.

The rudder hinge fittings, made from brass tube and thin sheet brass, should be screwed to the transom when the exterior of the hull can be painted and finished. In vessels of this kind it is common to see the rail left as varnished wood, finishing the paint line at the sheer line. The underbody below the waterline may be painted in a contrasting colour. Deck, cabin and coaming strips can be white. The latter are cut from $\frac{1}{16}$ in. thick hardwood and simply glued in place. When the paint job is completed, other deck fittings such as cleats, etc., can be added, also the fittings for the mast shrouds and the bowsprit.

The bowsprit is made from dowel, tapered off to the front and held down to the deck by two straps of brass or copper strip. A stay is carried back to the stem. The other rigging details are summarised in one of the detail sketches.

The rudder is cut from $\frac{3}{16}$ in. material painted or just varnished. It is also detachable with simple pin hinges. Provision should be made for lashing the tiller at any desired rudder setting.

No specific details are included of a suitable sail plan, but recommended dimensions are given in one of the sketches. Details follow normal model yachting practice. For sailing, however, it will be absolutely essential to fit a keelboard for stability.

The keelboard can be cut from $\frac{1}{4}$ in. ply with two metal top fittings which engage the keel on either side. Point of attachment of the keelboard should be exactly underneath the cabin and suitable ballast is bolted to each side of the bottom of the keelboard to balance the hull, with sails rigged, parallel to the design waterline.

When an auxiliary power unit is employed, attention must again be given to balance. If the power unit is fitted in the open cockpit then almost certainly ballast will be required for'ard to trim the hull properly. A good idea in such a case is to make the front hatch a proper hatch, using the space between Frames 1 and 2 as a compartment for storing the ballast, which can then readily be adjusted, as required. These and similar modifications to the basic design should appear fairly obvious when the model is completed and is being adapted for some particular use.

This model Dutch auxiliary is not a heavy weather model, so do not expect it to happily battle against "storm" conditions. Any water shipped will collect in the open cockpit and eventually the craft would become waterlogged. Nor can you expect to use it as a racing craft. It is a model for pleasurable sailing, so choose your weather accordingly. Use the sails in light breezes only, and if you *must* sail on a choppy pond, stow the sails and rely on the auxiliary motor. In other words, treat it as any self-respecting owner would a full-size auxiliary.

ELECTRIC GRANDFATHER CLOCK

(Continued from page 423)

train assembly, complete with hands, can be considered as a separate item which is merely offered up and secured in the top part of the case and driven by the ratchet wheel spindle. The ratchet wheel itself is driven by the gravity arm, displaced when the crutch pin mounted on it contacts the pendulum. This gear train will be mounted between a backplate and a faceplate, and the crutch pin will protrude through a hole cut in the backplate. This should be clear from the figure.

The gravity plate is T-shape, laid on one side when assembled. It is pivoted at the top point, as shown, to the backplate whilst the crutch pin is secured to the opposite end of the bar of the "T". A cut out in the centre clears the ratchet wheel spindle.

The ratchet wheel should be roughly $1\frac{3}{8}$ in. to $1\frac{1}{2}$ in. dia., and about $\frac{1}{16}$ in. thick. It *must* have thirty teeth to match the "seconds" pendulum when its corresponding movement will be one-thirtieth of a revolution for each completed swing of the pendulum, i.e., one complete revolution in thirty seconds. It is the spindle speed of the ratchet wheel which governs the requirements of the ensuing gear train which eventually drive the hands. A "seconds" hand, for example, if fitted, will have to be mounted on a spindle which is driven exactly twice as fast as the ratchet wheel; the main minute hand will be geared down in the ratio 60 minutes: 30 seconds, i.e., 120: 1, and similarly for the hour hand (ratio 12 x 120: 1).

Gravity arm and ratchet wheel must be very carefully mounted and the crutch pin located so that it is given its full sideways movement by the pressure of the pendulum bearing against it on each swing. It is a good idea to fit two stops projecting from the backplate to limit the actual pendulum swing to the maximum required, thus preventing any strain being produced by accidental displacement of the pendulum beyond its normal amplitude.

A driving pawl attached to the remaining arm of the T-shaped gravity arm engages the ratchet wheel, and is so proportioned and located that it moves the wheel round one tooth on each stroke of the pendulum, as received by the crutch pin. A second check pawl or detent should also be fitted, attached to the backplate, to prevent the ratchet wheel being driven past two teeth at once, or overrunning by its own inertia. Once this assembly is satisfactory you can demount it temporarily, work out and fit the necessary gear train to the hand spindles and then reassemble permanently in the case (Fig. 11).

Electric GRANDFATHER CLOCK

PART II

THE electro-magnet and the switchgear may now be assembled in the case. Start with the former as the simpler of the two. All that it is necessary to do is to mount the electro-magnet on a suitable packing block so that the pole piece on the bottom of the pendulum just clears the slightly projecting cores of the electro-magnet coils, centring these coils accurately under the pendulum. Screw the yoke of the electro-magnet down to the spacing block and anchor this block securely to the base of the case, once the correct height has been established.

The cross-beam can then be mounted between the sides of the case and immediately in front of the pendulum. A clearance of between $\frac{5}{16}$ in. and $\frac{3}{8}$ in. should be allowed between this beam and the pendulum, and it is important that the beam be exactly parallel to the swing of the pendulum. The top of the beam should also be horizontal and exactly 16 in. below the (inside) top of the case. The contact strips and trigger can now be secured to the cross-beam and pendulum respectively. Assemble the moving contact strip first and line up so that the notch comes exactly in line with the pendulum in its true vertical position. Then secure the fixed contact strip so that the two contact points mate up properly. The moving contact strip must then be given enough spring bias so that the contact points remain open unless the moving strip is depressed. A clearance of $\frac{1}{32}$ in. will be about right.

Now the trigger must be positioned in the centre line of the pendulum. Its exact position can best be determined by engaging the tapered end of the trigger in the notch in the moving contact strip, pressing this strip down as far as it will go (i.e., the two points in contact), and then positioning the pivot pin for the trigger accordingly. Set the pendulum swinging and note that whilst the pendulum is maintaining a full swing the trigger sweeps across the notch without engaging it but as soon as the pendulum swing decreases in amplitude the trigger catches in the notches and forces the moving contact strip down to engage the two contact points. This engagement should only be momentary and the trigger should disengage equally smoothly. Make small adjustments to the contact strips, as necessary, to achieve this required action.

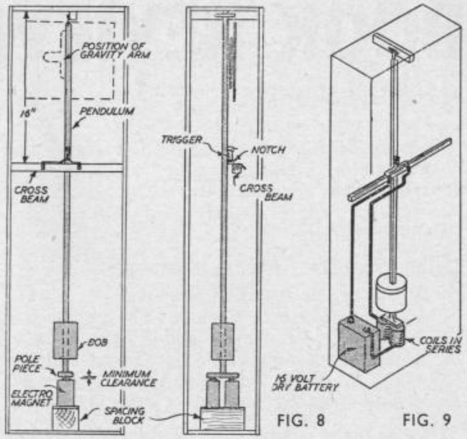


FIG. 8 FIG. 9

The electrical circuit can then be completed and the main "works" of the clock set in action. Wiring is very simple, as shown in Fig. 9. One side of the battery is connected to one side of the coils, the other side of the battery to one of the contact strips. The other side of the coils is connected to the other contact strip.

It is a good plan to connect up and set the pendulum working as a check at this stage, timing over a week or more, if necessary, and making adjustments to the pendulum bob until the correct setting has been established. Iron out any snags in the working of the pendulum system at this stage and you will not be likely to have any further troubles later on.

The final stage of construction then involves the actual wheel mechanism which translates the pendulum swing into rotary movement of the two hands moving over the clock face. All the wheels required can be found in an old clock and can readily be adapted. It is impossible to give exact details since the type and layout of gears vary considerably in different types of clocks, but examination of the original "works" should indicate which gear train is required.

Pendulum movement is translated into rotary motion by means of a 30-tooth ratchet wheel driven by a gravity arm (Fig. 10). The whole of the gear

(Continued on page 422)

FIG. 10

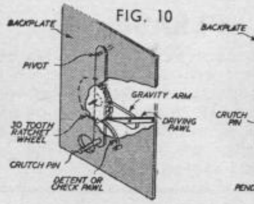
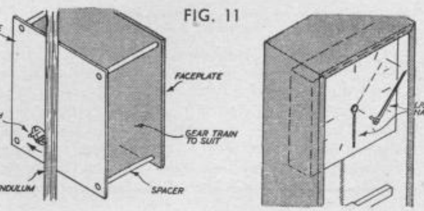


FIG. 11



BOOK REVIEW

Model Sailing Yachts.

By W. J. Daniels and H. B. Tucker.

Percival Marshall, London; 132 pages, size 9 in. x 6 in., 5 half-tone plates, 42 numbered line figures and 6 reduced size plans, with tables of offsets. Cloth bound, gold blocked cover. Price, 10/6d.

Build Yourself a Model Yacht.

By W. J. Daniels and H. B. Tucker.

Percival Marshall, London; 84 pages, size 9 in. x 6 in., 21 numbered line figures, full size working drawings for 30 in. Sharpie and 36 in. Class Restricted Yacht in special pocket. Cloth bound, gold blocked title. Price, 12/6d.

JUST as the Aga Khan and Monsieur Boussac conjure up thoughts of equine thoroughbreds to the horse racing fraternity, so do the names of Daniels and Tucker engender similar associations in the realm of model yacht racing enthusiasts when attached to boat or book. Though published in 1951 and 1950 respectively, we make no apology for reviewing these two books now, for with the racing season in full swing there must be many newcomers to the sport who have seen the experts at work and would like to emulate their efforts. With a constant influx of new blood no *good* textbook on fundamentals is ever out-of-date: so far as model yachting is concerned the pity is that worthwhile literature on the subject can be counted on the fingers of one hand!

In *Model Sailing Yachts* the authors set out to provide a short guide for the novice, pointing out pitfalls to be avoided, and covering the basic constructional principles of carved and planked models, together with chapters on keel, rudder, finishing, spars, sails, fittings and steering gears. Other chapters deal with rigging, tuning up and sailing. In the short space at their disposal their approach must necessarily be essential points rather than details. Wisely, we think, they have considered yacht fittings as items to be bought rather than fabricated; and have given only a short description of sailmaking, which may lead the novice to buy his sails rather than attempt the specialist work of making them. There are enough problems in building the hull and rigging the boat to satisfy the beginner, without risking unsatisfactory sailing through poorly made accessories.

While much of the contents can be said to apply mainly to the novice, there is nothing elementary about the designs round which the book is written. Specially prepared for *Model Sailing Yachts* they are worthy Daniels thoroughbreds, capable of racing in top class company. Three yachts are described, *Moth* a 10-rater, *Mosquito*, Marblehead 50/800, and *Midge*, a 36 in. restricted class boat. These are all pleasing designs, following modern practice: if we have any special preference it is for the Marblehead *Mosquito* which looks a very handy craft without too much "temperament", and should prove very satisfying even in less than expert hands. Reduced size plans and tables of offsets are printed in the book, so that they *can* be built without obtaining the full-size blueprints available from the publishers. We would strongly recommend the beginner, however, to sport 25/- to 42/- for these rather than risk errors and disappointment from inaccurate scaling up: after all a lot of manhours will be spent and should produce a valuable yacht good for many seasons of sailing.

Build Yourself a Model Yacht is essentially a book for beginners, covering the construction of two models. It offers a neat little unclassed hard chine sharpie of 30 in. length for the "pleasure" sailing enthusiast. A venture of this sort can get on the water for shillings rather than pounds and serves as a splendid training school in sailing that will be appreciated when more ambitious boats are attempted later. The other boat is a 36 in. restricted class yacht than can be raced, though it is not intended as an out and out racer, but as a little "first" boat easy to build and handle. Both these boats are covered in a step-by-step series of chapters which assume the builder has a knowledge of simple tools, but none of boat building. Happily, full-size plans are included in a special pocket, covering not only lines but also marked out for layers in the case of the larger boat, so that they can be simply pricked through on to the wood without fear of error. This representts an immediate saving to the would-be builder, and makes *Build Yourself a Model Yacht* a particularly good bargain for the beginner who is content with a less ambitious boat well within his powers to build and sail.

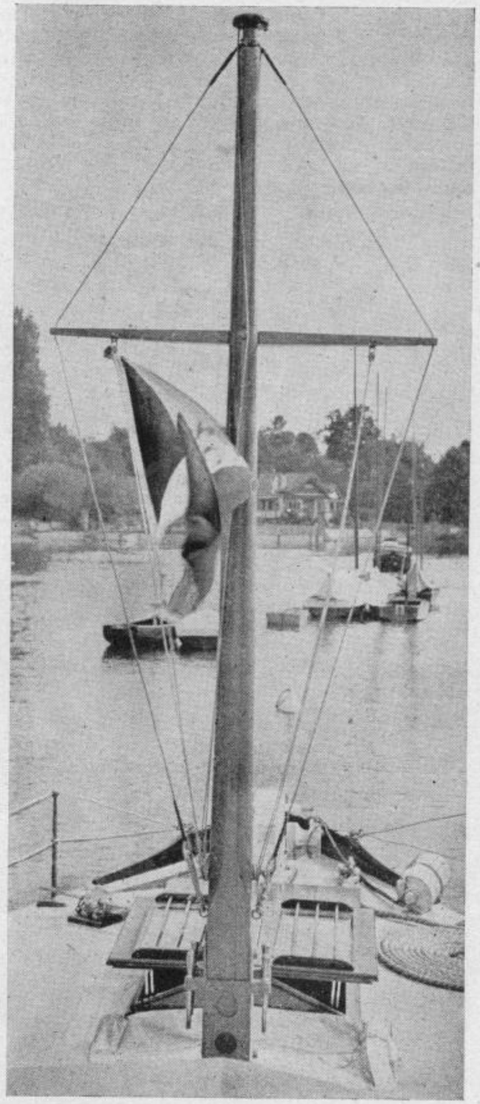
M.G.M. CONTEST "TO PLEASE A LADY" WINNER

WE ARE HAPPY TO ANNOUNCE THE WINNER OF THE M.G.M. MODEL CONTEST FEATURING CLARK GABLE'S OFFENHAUSER WHICH WAS ORGANISED LAST YEAR IN CONJUNCTION WITH "MODEL MAKER". IT HAD BEEN HOPED THAT SOME CENTRAL FINALS COULD BE ORGANISED FROM REGIONAL WINNERS, BUT THE NUMBER OF ENTRIES SUBMITTED WAS INSUFFICIENT TO JUSTIFY THIS. THE PRIZE OF A WEEK'S HOLIDAY IN THE ISLE OF MAN WITH FREE TRANSPORT BY BRITISH EUROPEAN AIRWAYS, HAS BEEN AWARDED TO MR. W. W. SHANNON, 7 LYNDHURST GARDENS, PINNER, MIDDLESEX. MR. SHANNON WITH HIS WIFE AND CHILD WILL BE STARTING ON THEIR HOLIDAY ON JUNE 7th — WHICH COINCIDES WITH T.T. WEEK. WE WISH THEM FINE WEATHER AND GOOD RACING.

PART III OF THE CABIN CRUISER

"DEGLET NOUR"

BY BERNARD REEVE MAINLY DESCRIBES WORK ON THE CABIN



THERE appears to be a lack of seasoned hardwood available, as I have just had the unfortunate experience of the bulkheads of my M.E. Exhibition model warping horribly after spending hours of work on them. I suggest, therefore, you use 4 mm. ply for your floors, and where mahogany bulkheads are required use Permapy marketed by Venesta Ltd., of Vintry House, Queen Street Place, E.C.4, which is veneered with teak and takes a most pleasing finish.

You will probably experience some difficulty in obtaining well seasoned mahogany for the cabin sides. I would, therefore, suggest you use $\frac{1}{16}$ in. ply which has greater strength and is lighter, and stands up to handling better than mahogany.

Now let us proceed with our constructional work as shown on Sheet 3. The fore-deck and cat-walk are in place, so our first job is to cut and fit the:

Cabin Roof Supporting Block

Lightness is important here so use a piece of obechi $9\frac{1}{16}$ in. long x $\frac{9}{16}$ in. thick x 2 in. wide. Cut to the dimensions shown on Sheet 3, slightly hollowing the underside to fit the curvature of the deck, curving the top to the same contour.

To give a better finish to the front of this block it should be plated with mahogany veneer sanding the edges down to blend with the rest of the block, drilling two holes in the appropriate position for the cabin port lights and set on one side while you cut the cabin sides.

Cabin Sides

As suggested above, use $\frac{1}{16}$ in. ply for these and you will require two pieces each 24 in. long x 6 in. wide. You may find that some of this ply is slightly under $\frac{1}{16}$ in. thick, in which case I suggest you glue two sheets together with casein glue before cutting out. The resultant thickness will be in the region of $\frac{3}{32}$ in. which is all to the good. To obtain the correct shape trace the outline by means of carbon paper from the plan on Sheet 3, then spot glue the two pieces of ply together at the corners and cut both together with a fretsaw. I always use metal cutting fretsaws, as I find you get a cleaner line. Cut the window openings first and clean up with a fine file. Now proceed with the rest of the cutting; when

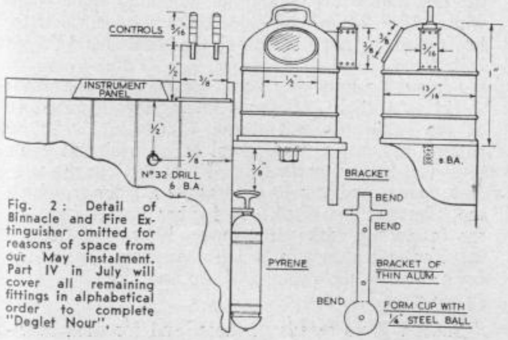


Fig. 2: Detail of Binnacle and Fire Extinguisher omitted for reasons of space from our May instalment. Part IV in July will cover all remaining fittings in alphabetical order to complete "Deglet Nour".

completed the two sides will fall apart, but will, of course, be identical. Draw file the outline by clamping both pieces in the vice and finally sand both pieces with the finest worn sandpaper until they are satin smooth. They may now be stained with mahogany stain.

Before proceeding further it is advisable to cut the window frames from 20 s.w.g. brass sheet. Lay the sides over the sheet, and with a sharp scriber mark the inner openings so as to allow $\frac{1}{16}$ in. smaller opening; this is necessary to form an inner rim to support the plastic windows. Cut to your line with an abrafile and $\frac{1}{8}$ in. outside this line cut the outer shape.

The windows are an exact fit in the openings in the cabin sides, and if you purchase your plastic sheet from Plastics Ltd., it will come to you with a thin paper skin. Do not remove this but use it to trace these openings.

Fitting the Cabin Sides

Set up the bulkheads and floor assembly and screw the cabin roof supporting block to the fore-deck with two wood screws. These screws are removed later and the cabin roof will cover the holes. Now glue and dowel the cabin sides to this block and to the bulkheads and cockpit seat back. When the glue has set, remove the screws in the block and the whole assembly will lift off leaving the cabin floor in place. Before doing so, however, mark the run of the cat walk on the cabin sides and glue on the $\frac{1}{8}$ in. x $\frac{1}{8}$ in. beading support.

The whole assembly should now be varnished—see instructions to follow. The brass window frames drilled with a drill just large enough to admit a small brass brad, the brad cut short and lightly riveted. For small work such as this I always use a tiny dental burrs—your dentist will be only too pleased to get rid of his old ones—and they are ideal for model work of all kinds. (You should have burnished your window frames and lacquered them before fitting.) Finally, fit the "Perspex" windows with adhesive and drop the whole assembly in place while you fit to it the cabin roof.

Cabin Roof

For this you will require a piece of $\frac{1}{16}$ in. ply 14 in. x 10 in. In marking out allow for an all-round overlap of $\frac{1}{16}$ in., and cut back to clear the dog-house sides where the roof enters the cockpit.

Referring to the half-size plan of the cabin roof on Sheet 3, you will observe that there is a $\frac{3}{16}$ in. square fillet glued on to fit inside the cabin sides. You will also notice that there are three beams each $\frac{1}{4}$ in. x $\frac{3}{16}$ in. Cut these flat on the underside and camber the upper surface to the curve shown on Sheet 1. These are halved into the side fillets and glued and dowelled to the roof.

On the upper surface of the roof in the plan you will see two $\frac{1}{8}$ in. x $\frac{1}{8}$ in. fillets glued at an angle. These are locating pieces for the lower edge of the front wind-shield.

If you have taken care in the cutting and fitting of this roof assembly you will find it a good fit between the cabin sides which may be firmly fixed by a thin coating of adhesive all round.

Dog-House Roof

For this you will need a piece of $\frac{1}{16}$ in. ply $9\frac{1}{2}$ in. x $6\frac{1}{2}$ in., but before fitting this part you should finish the cockpit right off by varnishing the interior and fitting all its accessories such as the wheel, binnacle, fire extinguisher, controls and instrument panel, makng sure you have left nothing undone as it may be a little awkward to reach certain parts when the roof is on, as expained earlier.

Referring to the plan of this roof on Sheet 3 you will notice that there is slightly more overlap than in the case of the cabin roof, but the side fillets and roof beams are made and fitted in the same way. There is, however, an end beam of $\frac{1}{4}$ in. square wood to make and fit to give a finish to this part of the roof. Here again this roof should be of sufficiently good fit to need only a thin coating of adhesive to make a sound job.

A word as to glues for these small sub-assemblies, I aways use Le Pages and find it holds well if allowed to become tacky before fitting the parts together. You may prefer one of the many other tube fixatives, or one of the acetates such as Durofix, which has the merits of being waterproof. As, however, these joints are painted or varnish, this point is not of paramount importance.

The underside of the dog-house roof is painted cream to match the hull.

The final fitting of the roof is the setting up of the two tubular stanchions whose shape is shown on the General Arrangement Plan (Sheet 1). These are painted maroon—same colour as the bottom of the model. When fitting the "Perspex" windows to the dog-house make your frames of veneer $\frac{3}{16}$ in. wide, glued on with an inner overlap to which the "Perspex" is fixed. When fixing "Perspex" use one of the acetate adhesives to prevent staining.

Wind-Shield

On the cabin top you have a $\frac{1}{8}$ in. x $\frac{1}{8}$ in. fillet fitted at an angle, the apex facing forward. Under the dog-house roof is another matching angle strip, while the inside of the sides carries a further strip, but these are not fixed until the wind-shield frame is in place.

I regret I cannot give you a template for the wind-shield as a slight difference in angle and curvature of the cabin top will throw it right out. So be patient and cut a card template by trial and error until you have a perfect fit. From this cut the window frame, and veneer it to allow a ledge to which the "Perspex" is fitted. A further veneer strip on the inside will make all secure. Now fit the frame in place and glue $\frac{1}{8}$ in. x $\frac{1}{8}$ in. securing fillets at the back of it on the cabin roof top and sides.

Hand-Rails

Sheet 1 gives details of these, and for their fabri-

cation you will require two pieces of $\frac{1}{8}$ in. x $\frac{1}{2}$ in. hardwood, not ply, $9\frac{1}{2}$ in. long, and two pieces 5 in. long.

I find the easiest way is to make them in one piece by scribing a centre line on the $\frac{1}{2}$ in. dimension. Then on this line at $\frac{7}{8}$ in. centres, drill twelve $\frac{1}{8}$ in. holes in the long strip, and six $\frac{1}{8}$ in. holes on the shorter one. Now by cutting along the centre line you produce a pair of symmetrical hand rails. Plane down and clean up generally with a fine file, but do not fit until you have finished off the cabin tops.

Before painting the decks and cabin tops you should make and fit the skylight hatch. This is fully detailed on Sheet 1, and should not call for detailed instructions.

The king-plank is of veneer, which is bright varnished and is fitted after the skylight is in place.

If you have been able to obtain your decking in one piece you can now paint this, as will be explained, the colour being a mid-buff . If separate pieces have been used you must canvas the deck as in the prototype. Use one of the parachute cambric or silk materials, and for an adhesive any of the photographic pastes now available. Do not pull the material more than enough to smooth any creases, and trim off the surplus around the edge with a razor blade. Then paint in the usual way.

Bow Wash-Boards

These should be cut to the dimensions shown on Sheet 1, and are made of $\frac{3}{32}$ in. thick ash, spruce, or other hardwood which will steam and bend to the deck profile.

My method for producing these is to take a piece of scrap obechi from the hull plank off-cuts, trace the line of deck at the bow where these boards will be fitted. Cut through this line with the fretsaw. You will now have a block in two halves with one concave and one convex face. Steam the shaped bow pieces until pliable and clamp between the two blocks for 24 hours. When released they will have the requisite curve. Fit by glueing and nailing to the deck with fine brads, but see that these are just long enough to penetrate the deck only, otherwise they may pierce the hull where the bow flares out.

When set cut out the fairlead, stain mahogany and varnish.

Painting and Varnishing—The Hull

The colour scheme is light cream topsides, pale blue boot-topping and maroon under-water body.

Obechi being an open-grained wood needs filling. Use one of the proprietary brands and apply as instructed. Give one coat of International Paint Co.'s metallic pink priming, stop any blemishes, rub down and apply a second coat. By the way, this priming is not pink as one would suppose, but a metallic bronze colour which rubs down to a smooth gun-metal-like surface. Next, give two coats of any good enamel undercoating, rubbing down with waterproof abrasive paper of the finest grade used with plenty of water. Finally, give a good flowing coat of enamel. As mentioned earlier, I use Robbialac Synthetic Finish with conspicuous success. Japlac is another suitable finish.

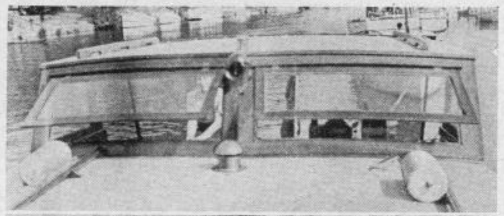
Varnish

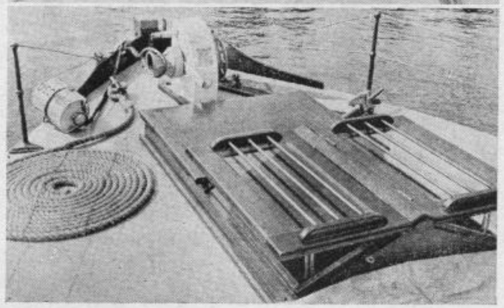
Use any good *Marine* varnish. Eschew cheap varnishes—they are useless for this work. I use International Paint Co.'s E309 marine varnish which is first-class and does not turn white when wet.

The first coat is 80 per cent varnish and 20 per cent turps. Rub down and give two more coats using well worn wet abrasive paper between coats, but leave the final coat bright.

Apply varnish with a full brush, but not full enough to run into tears and waves. Brush out as little as you can, laying off gently in one direction only, and you will achieve a superfine, durable finish. This completes our hull with the exception of the fittings which will form the subject of my next and final article, together with details of a suitable propeller.

Let me add a final word of advice. I know you will be beset by the strongest temptation to get the job finished. I know the feeling only too well. Resist it with all your power. Don't spoil the job for the sake of an impetuous urge. Give it the best you are capable of—you will not regret it. But if you scamp any part, that part will be an everlasting reproach to you and your urge to get the job finished. Another hour or two, a little more care and a little more patience will turn that reproach into pride — pride of craftsmanship and pride of achievement—so let patience be your watchword.





These two illustrations, and that on the preceding page are of the prototype cabin cruiser "Deglet Nour" and should be of particular assistance in producing an authentic finish.

THE ART OF SOLDERING

PART II BY ED VAN LEER

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Some care must be exercised with irons that are not protected by thermostats. If left "on" for long periods of time without being used, the tips will oxidize and require frequent re-dressing. There are numerous ways of protecting an iron without a thermostat. However, the simplest method is to disconnect the iron when it's not in actual use. Too much overheating or burning will eventually ruin the tip. I have put a switch in the cord of my iron a few inches from the handle so that it's very easy to flip the iron on or off.

Although it's not by any means necessary, it is very desirable to have an iron with interchangeable tips. This will permit a variety of tip shapes and sizes, which is very helpful at times. If your iron does not permit interchanging of tips, the most useful "universal" tip is a long, pointed pyramid. Another useful shape is a long, flat "chisel" head—the flat surface transfers large amounts of heat to the work if necessary. If your iron permits interchanging of tips, then the variety you can use is limited only by your imagination and your pocket-book.

Be sure to select an iron that is not too heavy in weight. Intricate model soldering is greatly hindered by having to "horse" a heavy iron around. This is one good reason for the thermostatically controlled iron—the thermostat controls the heat and a small, lightweight copper can be used.

But, remember always that no matter what kind of iron you have, no matter how much or how little you use it, no matter whether you do heavy or fine work—in fact, no matter what! — *always keep the tip cleaned and well tinned*.

There are many kinds of soft solder available and in many forms, sizes and shapes. You can get practically any mixture of lead and tin, but for all-round general utility the type commonly called 50-50 solder is probably best and is the most readily obtainable. Some like to keep a high tin alloy, say 90-10, on hand, for jobs involving the joining of many small pieces. The 90-10 is used for basic tacking, for it melts at a higher temperature than 50-50, and then the 50-50 is used for the final soldering. Used with care, this system minimises the danger of a complex assembly becoming unsoldered while putting on the last few pieces. Personally, I have never found it necessary to resort to this method.

Solid wire solder is probably the most useful in the modeller's workshop. It's best to stay away from flux-cored solder, particularly the acid variety. These types are too hard to control, and the acid core in particular is likely to cause troublesome corrosion. It is often desirable to limit the area of flow of the solder by limiting the amount of flux applied, but with flux-cored solder this is not possible. It's handy, however, to have *resin*-cored solder around for electrical work because it is sometimes difficult to get flux into a joint overhead in a complicated wiring system. Many mechanics prefer to use only bar solder. Actually, bar solder, if properly used, will help avoid getting excessive solder on the job, for it is not too convenient to feed bar solder right to the joint. As a matter of fact, most soldering experts advise carrying solder to the joint on the tip of the iron. Only in rare cases should solder be fed into the joint by holding against the tip of the iron.

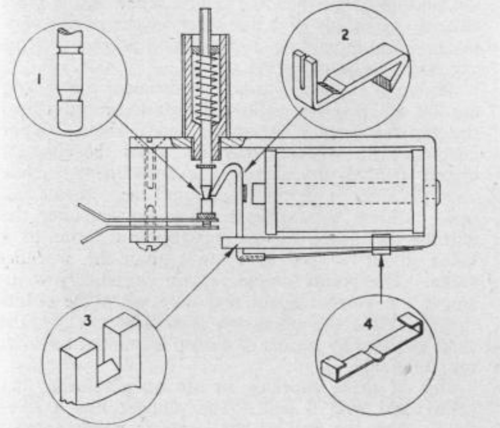
In addition to the lead-tin alloys, there are other solders available for special purposes. I'm thinking particularly of those designed especially for joining zinc die castings of aluminium. These metals are generally considered unsolderable, but there are solders which are reputed to simplify soldering these metals. I have had no experience with them and therefore can do no more than mention them here.

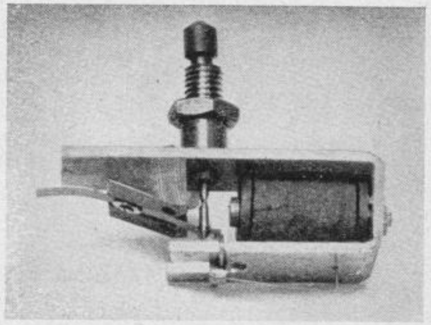
Flux is the next item of importance. There are many fluxes, but for model railway work we need consider but a few. The purpose of flux is to prevent oxidation of the metal surfaces to be joined and to dissolve any oxides that may be already present. Flux will *not* compensate for grease, dirt, paint or other foreign matter. Conversely, no matter how clean the surfaces are, they cannot be joined by soldering *without* the use of flux. All metals oxidize and oxidation is accelerated by heat. Therefore, the heat of soldering demands the protection of flux. Probably the most useful all-round flux is the common soldering paste. It is usually a combination of resin and zinc chloride and can be used on most of the common materials such as copper, brass, steel or tinplate. It is somewhat corrosive and the joint should be carefully cleaned when finished. Muriatic acid cut with zinc is also quite common, but I prefer to use zinc chloride crystals (from any chemists—a few pennyworth will make a lot of flux) dissolved in water. You see, muriatic (also called hydrochloric) acid in combination with pure zinc (dry cell cases are a good source) forms zinc chloride and hydrogen. The acid is sort of nasty to handle and hydrogen is explosive, so why not take the easy way? Don't use any more water than is required completely to dissolve the zinc chloride—in other words, make a saturated solution. This flux is highly corrosive and should be completely removed, particularly from steel or iron. A third flux, which is quite satisfactory but not very common, is phosphoric acid in alcohol. It is non-corrosive, but will work only with brass or copper. I like it particularly for trackwork or repairs on locomotives or coaches where its removal might be difficult or impossible.

(*Continued on page* 430)

Overload Cutout

"H.H.J." DESCRIBES A SIMPLE OVERLOAD CUT-OUT WHICH WILL BE FOUND PARTICULARLY VALUABLE ON CLUB LAYOUTS AND OTHER PLACES WHERE A VARIETY OF HANDS ARE LIABLE TO BE AT THE CONTROLS!





THE derailment of model rolling stock is only one of the occasions where some form of protection is needed in an electrical circuit. Fuses will give this protection, but have the disadvantage of being troublesome to replace. A cut-out does the same job as a fuse, but has the considerable practical recommendation that it can be reset with no more trouble than the pressing of a button, as well as acting very rapidly. The cut-out described below will work on any current from 5 ma. to 1 amp., if the coil be wound correctly and can thus be used for a considerable variety of purposes.

Principle of Action

The drawing (Fig. 1) shows the general arrangement of the device. A simple frame is bent up from steel strip. Inside this frame is a steel core carrying a bobbin with a winding to suit the current range. Close to the end of this core is a hinged pawl held against a plunger by a light spring. The plunger itself is spring loaded and its lower end presses on the top one of a pair of spring contacts. When sufficient current flows in the coil the pawl is attracted to the centre core. That releases the plunger and allows it to fly upwards, so opening the spring contacts and interrupting the circuit. To re-establish the circuit, the plunger must be pressed down and the pawl will then held it in place, provided that the current through the coil has been reduced.

The working range of the cut-out depends on the number of turns on the coil, the distance separating the pawl and the magnet core, the strength of the pawl spring and the depth of the notch in the plunger. By varying these features a very wide working range can be secured.

Mechanical Construction

The frame is a piece of $\frac{5}{8}$ in. x $\frac{1}{8}$ in. mild steel strip, bent to form a U-shape, the inside size being $\frac{9}{16}$ in. and the legs 2 in. and $1\frac{1}{4}$ in. long respectively. The core on which the bobbin fits is $\frac{1}{4}$ in. dia. x $\frac{7}{8}$ in. long, and is shouldered and riveted into the end of the frame. The bobbin may be made of any suitable material and is $\frac{1}{2}$ in. dia. x $\frac{3}{4}$ in. long. The plunger guide is a $\frac{3}{4}$ in. length of $\frac{3}{8}$ in. dia. brass rod, threaded 26 t.p.i. outside to give a convenient one hole fixing. A short length at one end is reduced to $\frac{1}{4}$ in. dia. and screwed 40 t.p.i. The bush is drilled $\frac{1}{4}$ in. dia. for a depth of $\frac{1}{2}$ in. and $\frac{3}{32}$ in. dia. for the remainder.

A piece of $\frac{3}{32}$ in. dia. rod is threaded 8 B.A. to take a guide collar and operating knob. The other end has two grooves turned in it. Details of these can be gathered from the first inset sketch. For very small currents—5 ma. to 10 ma. — the bottom groove should be only about .005 in. deep; heavier currents enable this depth to be increased to .01 in. or .015 in. This groove must be quite true with the rod or the operating current of the cut-out will vary if the rod gets turned round. The upper groove can be of any convenient size and shape. Its purpose is to hold a small wire ring that prevents the plunger rising too far. A total travel of $\frac{1}{8}$ in. is ample.

The pawl or armature is made from a piece of $\frac{3}{16}$ in. x $\frac{1}{16}$ in. steel, bent as shown in the second inset. A 90° groove is cut across the back of the pawl and this rocks on a knife-edge formed on the end of the frame as the third inset shows. The tail of the pawl has a fine saw cut down the middle. The control spring is pushed into this slot and then lightly riveted over, and finally held by a spot of solder. The free end of the spring is held by a rider made from tinplate to the shape shown in the fourth inset.

Phosphor bronze or hard spring brass is best for the contact springs. These can be of any required size and strength, but should be quite light where low values of operating current are aimed at. The springs are held in place by blocks of insulating material in the usual relay manner. Two screws should be used to fix the main block to the frame, and if a single screw is used to grip the contact springs both must have clearance holes to avoid short circuiting the contacts. These last are best made from small pieces of silver wire. If both contacts are to be insulated from the frame a small bakelite stud must be provided against which the end of the plunger can press.

Assembling

Test each part before assembling. Pay particular attention to the finish of the edges and the slot on which the armature rocks, and to the freedom of motion of the plunger. Fix the bobbin first and then screw in the plunger guide. Then assemble the plunger with its knob, guide and return spring. The contact assembly can then be added. Slide the rider along the frame as far as it will go and then add the pawl. A piece of thin paper should be stuck to the back of the pawl opposite to the centre pole. This will prevent "freezing" when the armature is pulled back by the magnet. The gap between the end of the magnet and the pawl should be as small as possible. If the depth of the slot in the plunger is .005 in. a clearance of .008 in. between the armature and pole face is ample. Larger clearance can be allowed when the working current is over about 15 ma.

Windings are not critical. For the 5 ma. to 15 ma. range, fill the bobbin with 40 or 42 s.w.g. wire. Currents of 20 ma. to 50 ma. need a winding of 36 to 38 s.w.g. Higher values—100 ma. to 200 ma. require 28 to 30 s.w.g. with 24 or 26 s.w.g. for the $\frac{1}{2}$ amp. range. Wire of 20 to 22 s.w.g. will be correct for currents from $\frac{3}{4}$ to $1\frac{1}{2}$ amps. Enamel insulation is adequate.

Adjustments

Adjustments are made in the same way for all current ranges except that, for the smallest values, the cut-out should be mounted in its working position. If this is not done, the effects of gravity may alter the results appreciably.

One end of the winding is first wired to the positive of the supply and the other to one of the contacts. The remaining contact is connected to the apparatus to be protected.

Set up a battery, variable resistance, meter and cut-out all in series. Close the contacts and adjust the resistance until the meter reads about 20 per cent over the working current. Hold the contacts closed, if necessary, during this adjustment. Now slide the rider along the frame until the contacts just open. When this appears to be correct alter the current by means of the variable resistance to a value about 10 per cent lower than the working value. The points should remain closed. Now increase the current again and note when the points open. When the operation is satisfactory, fix the rider in place by means of a drop of molten beeswax on either side.

One of these cut-outs, in use on a railway, has been fitted with a bell. The plunger hits a lever that strikes the bell as the contacts open, a great convenience when derailment takes place in a tunnel.

The photograph shows the appearance of the finished article, except that the particular model has only a single contact spring instead of the two shown in the drawing.

THE ART OF SOLDERING *(Continued from page 428)*

Get 1 oz. of phosphoric acid and dilute it with 3 oz. of denatured alcohol. It is necessary to add a small quantity of alcohol occasionally to replace the loss due to evaporation.

Soldering paste is best applied with a matchstick, but the liquid fluxes can be handled more easily with a pipe cleaner. Always use plenty of flux. Too much is better than too little. On the contrary, however, the flow of solder to unwanted areas can be limited to some extent by the judicious application of flux.

While we are talking about fluxes, I might mention sal ammoniac. Sal ammoniac is preferred by many soldering experts for cleaning the iron. It can be purchased in little blocks about 2 in. square and 1 in. thick. Kept on the bench, it makes cleaning the iron simply a matter of frequently rubbing the tip firmly on the block of sal ammoniac. Its action is twofold. The abrasive action of rubbing the tip on the block cleans as well as the chemical action of the sal ammoniac itself.

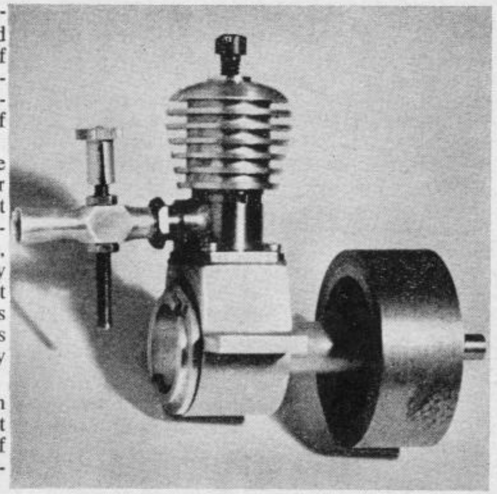
For heavy soldering or sweating, a blowlamp of some kind is very handy to have. The cheapest and easiest to handle is probably the self-generating blowlamp commonly used by electricians. It produces a hot clean flame, is relatively safe and is easily carried in the tool box. I use mine very little since I obtained a 225 watt iron, but whenever I have a couple of heavy pieces to join I use the blowlamp. I have also used it to pre-heat large pieces preparatory to doing the actual soldering with an iron. Some prefer to use a jeweller's blowlamp with a blowpipe. It is possible to do excellent work with this combination, but it requires much practice and skill. Generally, the use of the iron is simpler to master. I have never found a need for a jeweller's lamp and therefore can't tell you much about using one. I do know this though, the flame from a jeweller's lamp is extremely hot and can be projected to a very small fine point, but if it accidentally impinges on wire handrails or other small parts, it will burn them or at least anneal them so that they lose their strength and stiffness. The same is true of alcohol and other lamps. So, be careful.

(To be continued)

HAVING read in several articles that the construction of a compression ignition engine is beyond the scope of the average model engineer, because of the skill required in obtaining the necessary precision, I had never contemplated building one, especially as I did not feel that I could even dub myself average.

Then I was bitten by the Rail Car Bug. For some months I had attended track meetings of our Car Section, and the interest steadily grew until I felt that I, too, must "have a go". Being a tyro I naturally started what I now know to be a difficult type, and having worked at it for some months eventually reached the happy stage where I needed some sort of motive power. This was a bit of a headache as I did not want to run "commercial" and yet was more than worried about my ability to build my own engine.

One evening I was discussing my problem with Arthur Weaver, who showed me one of his latest engines which he had developed over the course of several years, and which he has run with great success on our own Rail Track.



A 1C.C. C.I. ENGINE

PART I OF A STEP-BY-STEP SERIES ON AN ALL FABRICATED ENGINE FOR HOME WORKSHOP CONSTRUCTION BY A. F. WEAVER & W. W. RANSOM

In the course of the following articles I intend to deal with the construction of this 1 c.c. c.i. engine step by step giving all the necessary tips as they arise, together with some useful jigs, fixtures and tools (which can be home-made) for easier production.

The only casting which might be thought necessary is that of the crankcase, but even this can be made from the solid fairly easily. If there is sufficient demand for castings no doubt arrangements can be made to provide them.

We would advise intending builders to follow the order of construction as this has been carefully considered, and to remember that it is better to remove a little too little metal than a little too much when machining.

This engine has the beauty of being simple and easy enough for the average layman to machine. Of course, it requires precision work and considerable care, but the component parts are so simple that should one make a mess of several items they can soon be remade with the expenditure of very little time.

So no amateur need be put off at the outset by the thought that he could never achieve the required standard, for with a little patience and care and the spoiling of a few parts en route he will be able to produce this most satisfying unit.

1. Crankcase Door (Phase 1)

This is turned from $\frac{7}{8}$ in. or 1 in. dural bar stock. Chuck the material and after facing turn to .790 in. for $\frac{5}{32}$ in. and turn the recess. Screwcut 32 t.p.i. (30, 28, or 26 t.p.i. will be satisfactory). Part off at $\frac{5}{16}$ in. Unchuck.

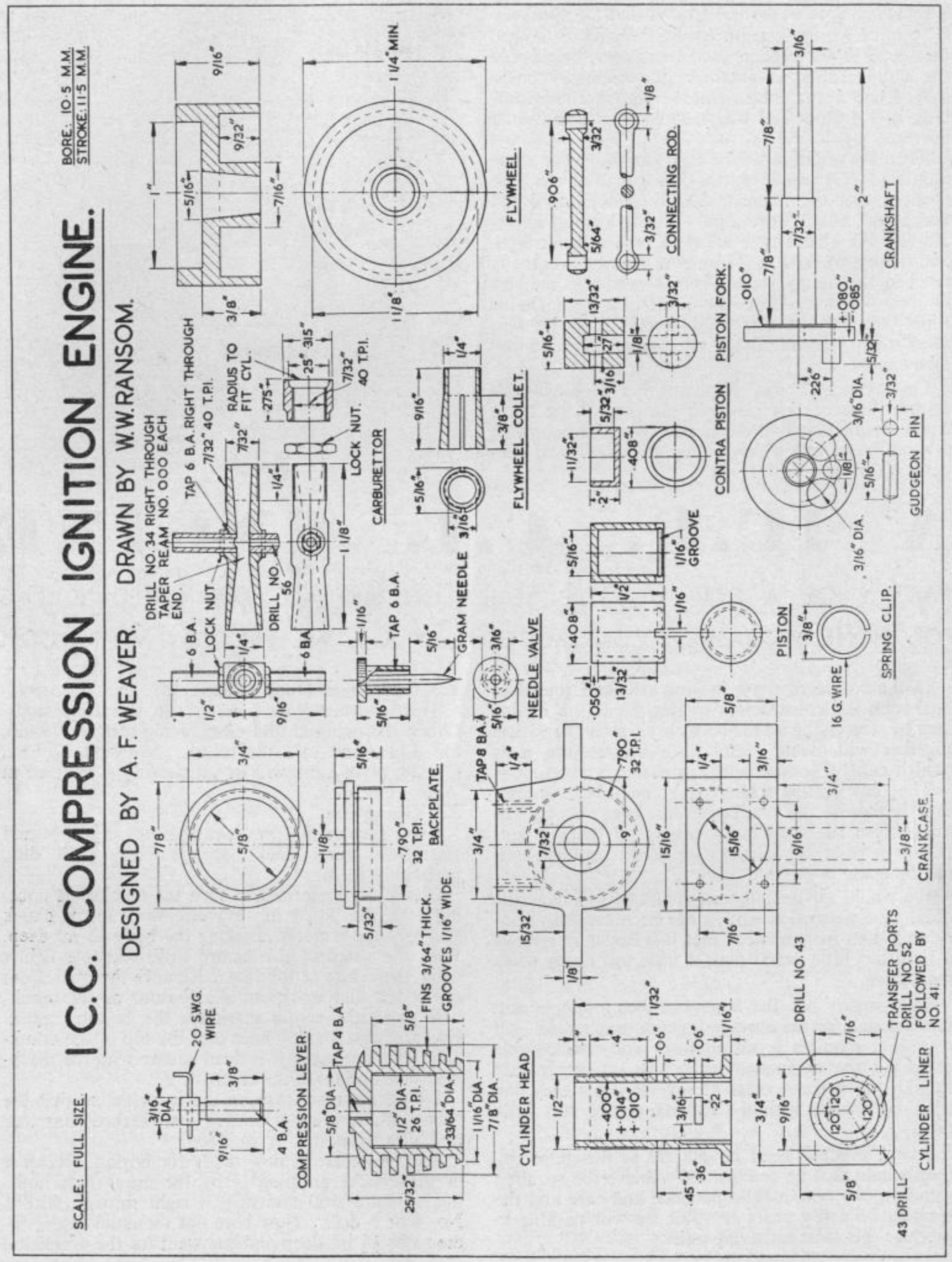
2. Crankcase

I will assume that the casting is not available and start from dural stock not less than $1\frac{1}{2}$ in. dia., preferably $1\frac{5}{8}$ in.

Chuck the material and turn the crankshaft housing $\frac{3}{8}$ in. dia. for $\frac{3}{4}$ in. Reverse work in the chuck and face the material, making the body $\frac{11}{32}$ in. deep. With the smallest size centre drill available lightly mark the centre of the face. Remove the work from the chuck and mark out the contour of the crankcase using the centre mark for the bottom radius. File to shape making sure that the top of the crankcase (cylinder seating) is dead square with the machined face and mark the centre of it.

Fit up the crankcase on the faceplate so that the centre of the cylinder seating just marked runs true and bore $\frac{15}{32}$ in. dia. $\frac{3}{16}$ in. deep.

The crankcase is now ready for boring. Reset it in the chuck, gripping is by the crankshaft housing. Centre drill and drill it right through with a No. 4 or 5 drill. Now bore out the crankcase $\frac{3}{4}$ in. diameter $\frac{15}{32}$ in. deep and screwcut for the crankcase



door (same thread) to the depth of ¼ in. Remove the feather edge at the beginning of the thread with a slight chamfer. Lastly ream the crankshaft bearing $\frac{7}{32}$ in. diameter. It will pay to clean up the edges of the bearer lugs at this stage to facilitate lining up the engine in your chassis.

If the casting is available a slight change in the order of machining can be arranged. Set the casting in the chuck by the crankshaft housing, centre drill and drill with No. 4 or 5 drill and ream $\frac{7}{32}$ in. Face and screwcut for crankcase door. Chamfer feather edge of thread and clean up lugs as above.

3. Crankcase Door (Phase 2) and Crankcase (Phase 2)

Continuing, grease the thread and screw in the door already prepared, and bore the recess in it. Remove the work from the chuck and file the slots across the crankcase door. Check that the cylinder seating is still square to the front face. File a clearance in the cylinder seating hole for the connecting rod.

4. Crankshaft

This is made from ¾ in. mild steel bar. It will pay to make the jig and fixture suggested as it is possible that more than one attempt will be necessary before one is satisfied, also they can always be used for making replacements, or in fact any other crankshaft up to 30 c.c.

Dealing with the jig for boring the balance holes first. It is made from a piece of mild steel ⅞ dia. $\frac{3}{16}$ in. thick. Centre it and scribe a circle $\frac{7}{32}$ in from the centre. On this circle mark out two centres at 90 deg. Drill two holes $\frac{3}{16}$ in. diameter. Drill the centre hole with a C drill and radius one entrance.

Secondly, the fixture for machining the crankpin to the correct throw.

The drawings are almost self-explanatory. The main body is made of mild steel, and the insert is of dural with two steel plugs to locate the balance holes. The insert is slotted at C after fitting to the body and fixing with two steel pins, A and B.

Now to proceed with the crankshaft. Place the bar in the chuck and rough-turn the mainshaft until it fits the centre hole of the jig, and centre the end. Remove from the chuck and cut the crank pin end to length. Place the shaft in the chuck and deeply centre drill until the crank disc is entered. Remove from the chuck and slip the crankshaft into the jig and drill the balance holes.

Put the crankshaft between centres and finish to size. When finished it should be a tight push fit with the bearing in the crankshaft housing.

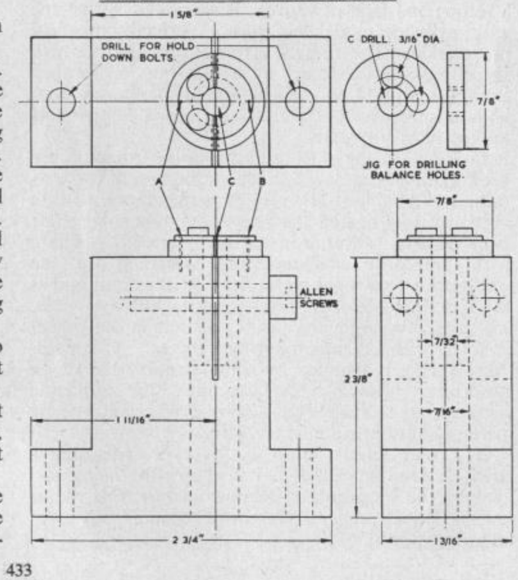
With the crankcase on the crankshaft replace it between centres and finish the back of the crankcase, and also reduce the crankshaft housing to its correct length.

We now come to turning the crankpin. Place the crankshaft in the fixture and set it on the faceplate between two metal strips on the long sides and another on the short crankpin side, as in the photo. Now set up until the centre runs true. Next prepare a short piece of strip metal 1⅛ in. long filed to .226 in. thick, and after slightly slackening the hold-down bolts insert this between the rear strip and the fixture. This will move the centre by the exact distance of the throw. Tighten the hold-down bolts and turn the crank pin.

Remove the work from the fixture and caseharden the *crankpin*. This is best done by moistening a little Kasenit with water and dipping the crankpin into it. Then heat the pin by holding it in a flame until cherry red for about ten minutes. It should then be plunged into cold water.

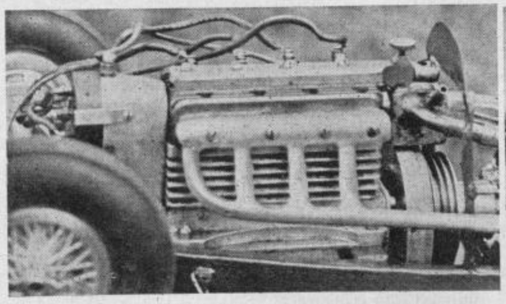
The crankshaft bearing should now be lapped with a piece of wood dowel turned to a really good fit, on which has been smeared a suspicion of a fine lapping abrasive, such as Carborundum Superfine Water Paste (Brasso will do) until a running fit is obtained. The wooden lap should be held in the chuck and revolved at the lowest possible speed, the work being applied to it and traversed fairly rapidly back and forth along the dowel. I can imagine the horror of the purists reading of this last operation, but it has been proved by a long line of successful engines that provided a wooden lap and not a metal one is used the abrasive will not bed into the bearing. Also the amount of metal removed in this operation is extremely small. Remember we already have a push fit, and the final fit must be tighter than would be considered a normal running clearance in any other type of model. The crankcase should be scrupulously cleaned after this operation.

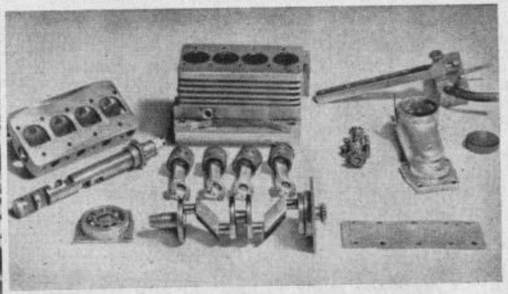
FIXTURE FOR TURNING CRANKPIN.



A FINE 4 CYLINDER MODEL

MODEL MAKER VISITS ERIC SNELLING IN HIS WORKSHOP TO DESCRIBE HIS LATEST MARVEL





(Above) A real bonnet-full! Nearside view of the four-cylinder O.H. rotary valve engine installed in the chassis, and the engine dismantled to show the component parts. Top right is the induction manifold with working fuel tank and valve.

IT will be generally agreed that the multi-cylinder engine is the dream and ideal of every model car builder, even though in practice he is forced to abandon his ideals and make do with a more mundane power unit, to wit, that good old standby, the single cylinder two-stroke.

Not many months ago rumours began to reach us of a project which Eric Snelling had in hand in his workshop in North London, to take the form of a four-cylinder rotary-valve four-stroke, destined for a "twin-cam" Austin which was to follow closely on the prototype in layout and outline. In an astonishingly short space of time it was reported that the model was actually functioning, and at the Croydon meeting at Hubert Dees' premises, the model car public were able to examine the car and hear it run.

At the opening meeting at Edmonton a week or two later, the car was given its first track airing, and although bothered by clutch trouble, due to too light a setting and lack of springs, it was obvious that the multi-cylinder model car was a perfectly practical proposition. The engine started easily, and ran with surprising silence, aided by a working four-branch exhaust manifold and tail-pipe, and the chassis with its imposing layout of correctly disposed components looked most impressive.

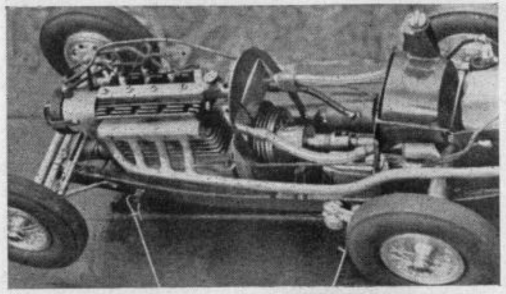
In building the Austin, little or no attempt has been made to cut down on weight or to aim for anything remarkable in the way of performance, so it is not surprising to find the chassis frame a solid affair bent up from sheet iron to an inverted U-section, with brazed-in cross-members stiffening up the whole to a very rigid structure. At the front end is the familiar "Works" Austin straight front axle, which is tubular in the prototype, but in the model is solid, with brazed-on spring hangers. The transverse spring is damped by transverse friction shock absorbers. Brake backplates have the authentic rectangular cooling slots, and the wheels pivot by permission of a lockable track rod.

The rear axle is of orthodox type, enclosing a 1.75 : 1 bevel gear and pinion, the casing being carried by the long quarter-elliptic springs with radius rods mounted immediately above them, exactly as in the prototype.

It was considered essential to have the main fuel tank located in the correct position in the tail, which places it well above the jet level. In order to make this scheme work satisfactorily it was necessary to adopt the old "chick-feed" system of supply. After some experiment it was found that the best position for the needle valve was at the extreme rear of the inlet manifold, an arrangement which gives perfectly satisfactory gas distribution, so the jet is in fact fed by suction from the small rectangular working tank immediately behind the engine, which in its turn is supplied from the main tank mounted behind the driving seat, level in the smaller tank being maintained by the familiar system of balancer pipes.

Behind the main tank the coil and Nife battery are carried. During the car's initial trials there was some suspicion that the battery was inadequate for the supply of current to the distributor, for starting purposes, but it would now appear that a slight disinclination to start without the aid of a booster battery was probably due to an imperfection of the gas seal in the rotary valve on one cylinder, a defect which is to be rectified forthwith.

The tyres fitted to the Austin are old pattern Z.N. racing pneumatics, fitted to specially-turned rims supported by their dummy brake drum backs, and embellished with front row spoking of fuse wire, the spokes being inserted individually. Of the body we should say that this is at the moment merely a shell, beaten up to approximately the correct outline of the car, although it was found that even by inclining the engine slightly forward it was impossible to maintain the exact line of the nose; a small price to pay for so much authenticity within, we feel, and before the car is finished it will have a body which really does justice to the "works". We are leaving the builder himself to describe the engine, of which he kindly allowed us to take detailed pictures.

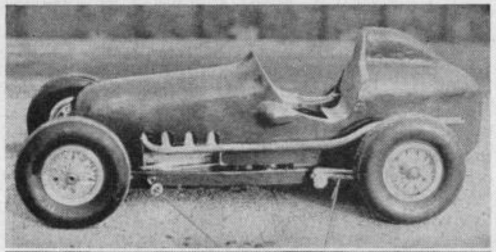


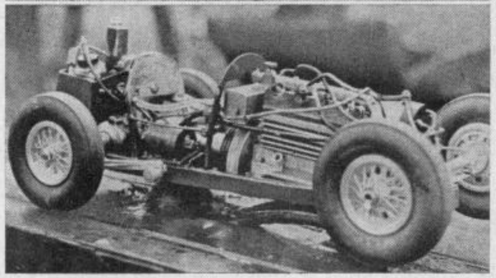
A further picture of the chassis, and a shot of the builder, Eric Snelling, making adjustments for the car's initial run at Edmonton.

"Having built several 'conventional' single-cylinder two-stroke motors of the diesel, glow-plug and spark ignition types, ranging in size from 2.5 c.c. to 10 c.c., and having watched them scream their heads off as they propelled scale outline versions of the Lago Talbot, 4/CLT Maserati and B.R.M. around the concrete circle at fantastic speeds in relation to their size, I began to hanker after something a bit more realistic. Whilst admiring such masterpieces as the 'Seal' 15 c.c. motor, it did seem to me that they were very complicated for their size, and as I hoped to install my motor in a chassis and run it in suitable competitions, experience dictated that it should be kept relatively simple. Thus was born the idea of using the overhead rotary valve which had been tried in certain motor cycle engines with limited success.

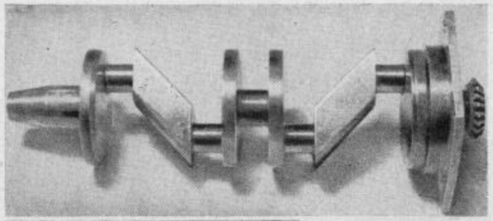
"I turned the idea over in my mind for a time, and having at last convinced myself that such a design was practicable, I proceeded to get something on paper. Size was the main bugbear for I wanted it as small as possible consistent with its capacity of 10 c.c. As each cylinder would be of 2.5 c.c. capacity I decided the stroke could be brought down to $\frac{1}{2}$ in., thus the bore worked out to $\frac{5}{8}$ in. This, plus the smallest amount of metal it was deemed advisable to have between the cylinders ($\frac{1}{8}$ in.) gave a block length of $3\frac{1}{8}$ in.

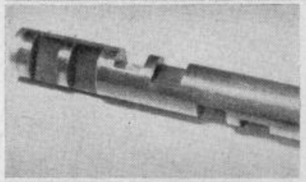
"Perhaps somewhat strangely, the cylinder head



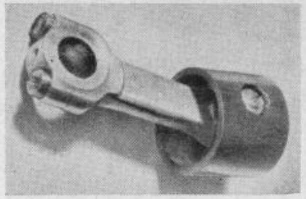


(Right) The Austin with its unfinished bodywork in position. Even an inclined engine mounting did not allow the correct down-sweep of the radiator fairing to be achieved, but in general outline the car is a good representation of the prototype. (Below right) Offside of the chassis, showing sparking plugs and battery location.





(Above) The one-piece crankshaft with front bearing housing and bevel for the vertical drive to the rotary valve. Note the provision for a centre-bearing.



(Left) The rotary valve, showing the flats which provide admission to the ports in the head, and a robust con-rod, with ringless cast iron piston and split big-end.

was the first part constructed, but this was done mainly to see how things worked out. It is of ordinary cast iron and is $3\frac{1}{8}$ in. long by $1\frac{5}{8}$ in. wide and $\frac{5}{8}$ in. deep. The hemispherical combustion chambers were first turned out on the lathe, and then a $\frac{7}{16}$ in. hole was bored through the head, from front to rear, to accommodate the rotary valve. This hole was most important and had to be dead true, and the interior honed and polished to a mirror finish—as good as that obtained on a model diesel engine cylinder. When the rotary valve was fitted it had to be a gas-tight fit and yet it had to be sufficiently free to run without seizing-up. This tendency to seize up is very common on rotary valve motors, but so far has not occurred with my engine, due no doubt to the fact that petrol-oil mixture is employed and that the induction ports alternate with the exhaust ports. Thus the valve is cooled by the incoming gas charge as well as lubricated. The ports were bored next—the inlet vertical and the exhaust at 90 deg. to it on the nearside of the head, the exhaust in order to give a cleaner opening.

ports being shaped thus 

"Nickel steel is used for the rotary valve; it is $\frac{7}{16}$ in. in diameter and highly polished. It is driven from the front end of the crankshaft via a vertical shaft and two pairs of bevels giving a 2 : 1 ratio, and the valve turns at half-engine speed.

"The rotary valve drive is housed in an alloy casing cast up from old car pistons. The 'valves' themselves are flats milled on the shaft, the positions having been marked on the shaft by means of a scriber through the ports. Timing was determined by a suitably marked disc mounted on the front end of the shaft. Valve timing is as follows: Inlet opens 10 deg. before TDC, closes 5 deg. after BDC. Exhaust opens 15 deg. before BDC and closes 5 deg. after TDC.

"Mixture is fed through the centre of a dural manifold carved from the solid and secured to the head by four 6 B.A. screws. Sparking plugs are positioned in the offside of the head at 30 deg, and are of the $\frac{1}{4}$ in. short reach variety. Nine screws, four on the offside and five on the nearside, secure the head to the block.

"The cylinder block and crankcase were next on the list, and these were cast in one piece, again from old car pistons melted down. Five horizontal cooling fins were machined out on each side of the block which is mounted by four lugs—one at each corner. The sump—for it does contain oil for the additional lubrication of the big ends—has a bottom plate of dural secured by ten screws. The cylinders were next bored out and nickel steel liners $\frac{1}{32}$ in. thick were pressed in. There may be some criticism concerning the use of this material for liners, but so far it seems to be standing up to the job. Pistons are, at the moment, cast iron, but at a later date alloy pistons with two rings each will feature in the specification. The firing order is 1-3-4-2, and heat dissipation from the cylinder head to the block is very good. In fact, on test, it has been found that after running, the head is cooler than the block itself.

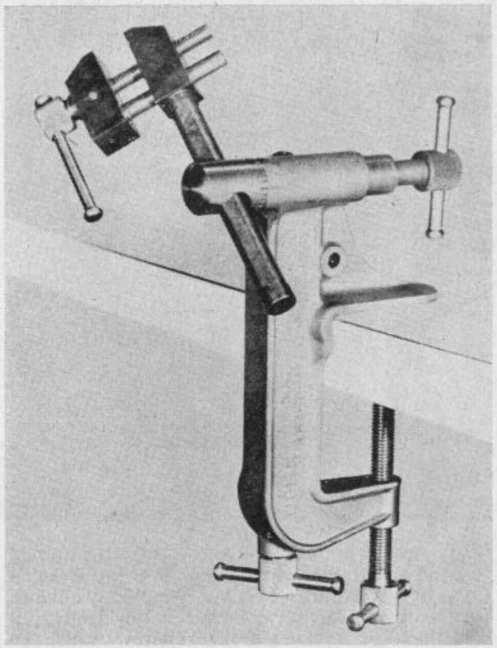
"The crankshaft was turned from a 1 in. dia. bar of nickel steel and runs in two ballraces mounted in the crankcase end plates; provision has been made for one plain bearing in the centre of the crankshaft should this be found necessary at a later date. Con.-rods are of dural and oval in section, and split big ends are employed, secured by 8 B.A. screws. Lubrication of the big ends is, as I have stated previously, achieved by oil contained in the bottom of the crankcase which has an external filler on the offside.

"Ignition is supplied by a contact breaker and distributor mounted at the front of the engine and carried on an extension of the rotary valve shaft. This extension, which is detachable, terminates in a square section which forms the cams for the operation of the contact breaker. The rotor is made from fibre and is circular in shape; the H.T. lead from the coil is led into the centre of an ebonite distributor cover which has its central carbon brush spring loaded as in full-size practice.

"On test the engine has shown itself to be relatively easy to start on the starter, and it runs with an uncanny silence after the usual howl of the normal racing two-stroke. In fact, now that it has been installed in a twin o.h.c. Austin chassis and endowed with a four-branch external exhaust manifold, it is almost inaudible."

TEST BENCH

A REGULAR TRADE REVIEW



Third Hand for Modellers

THE Eclipse people have always produced tools that did jobs instruments on the "classic" pattern would hardly even attempt; old and tried favourites in our toolchest include their famous pad handle —now, incidentally redesigned and much improved —their popular range of saw blades and saws, their universal tool set, with its range of files, slitting tools, scrapers and the like. We have now added one of their instrument vices to our collection, and only wonder how we ever managed before. It does indeed provide all that is suggested by a "third hand". For those who have not examined this versatile fixture it can best be described as a bench cramp, with swivelling head, into which fits a small stake vice. The swivelling head is calibrated for ease of repeat set-ups, while the stake vice jaws are grooved to take round material if required. All clamping screws are adjusted by spring loaded tommy bars which are prevented by ball ends from working out or being removed. In addition to its normal functions as sold, the stake vice can be removed and replaced by any of the Eclipse pin vices up to $\frac{3}{8}$ in. diameter. Again, in combination with another similar vice or as an accessory to a more massive bench vice, it will be found of practical help in jigging up work for welding, brazing or soldering.

Materials for Model Ship Builders

Our old friend Arthur Mullett has long been a regular advertiser in *Model Maker*, and readers have appreciated the enterprise with which he has put up wood parcels for boats described in our columns, and offered a considerable variety of boat and yacht fittings for those not wishing to make their own. At the same time he is one of the few firms offering a tailor-made sail service for model yachtsmen. In these hard times we have to thank Mr. Mullett for pointing out extravagance in our design of the cabin cruiser *Deglet Nour*. Here, owing to the prototype shape, it was impossible to get any planks out of one another—all centres going to waste. Happily, the designer has now evolved a super economy method, combining a solid "bread and butter" bow with ribs and planking aft. We shall be including this "economy" method with all future sets of plans, and Mr. Mullett will be offering a revised wood parcel; so that earlier prospects who have been shocked by the amount required are urged to request details of the new bargain lot.

We welcome two further suppliers of model ship materials to our advertising columns this month. First, Scottish Modelcraft, who have long been modestly represented in our Model Shop Directory, announce some of their very wide range of plans, timber parcels and instruction sheets, for launches, motor torpedo boats, motor yachts, deep-sea salvage tugs and a variety of sailing craft. In addition to supplying their retail customers, Scottish Modelcraft are also happy to supply retail model shops on appropriate terms. One service of particular value to readers is their willingness to build hulls, produce drawings or make fittings to customers' individual requirements. Other items include useful accessories such as their hand-worked Phosphor Bronze Rigging Wire—sample coils in three-, four-, and six-strand thicknesses are available at 2/6d. each to introduce this line. This, too, is available to the trade.

Precision Model Engineering Co., have also returned to the ranks of our advertisers in this issue, with emphasis on their model ship services. We would draw readers' attention to the arrangements made with this company by designer Bernard Reeve for the manufacture of fittings for the cabin cruiser *Deglet Nour*. These should shortly be ready, and would ease the path of the enthusiast who is anxious to proceed towards the radio control side of the model without spending too long on the accessories. They will also be putting up a timber parcel. It is also rumoured that they may be marketing a marine unit specially designed for this boat—we look forward eagerly to an opportunity of trying out the prototype.

. . . New Record Run at Edmonton Open Meeting

Eric Snelling about to send off the 4-cylinder Austin on a demonstration run during the interval. This model is described fully on pages 435-7.

THE racing season out-of-doors was given a rousing send-off by the Edmonton M.R.C. at Pickett's Lock Lane on Easter Sunday. Weather conditions were warm and slightly overcast, and evidently well suited to Joe Shelton's Dooling Arrow, which by hand timing was exceeding 135 m.p.h. in practice, which fact added considerable piquancy to the competition proper, since it was tolerably certain that, barring accidents, a new Open Quarter Mile figure would be set.

The terms of the George Laird Trophy called for two runs, one from a standing start and one with flying start, the winner being the competitor whose estimated average for the two most closely approached his actual average. Only four 1.5 c.c. cars had been entered for the first class, and of these only two completed their runs. Alec Snelling's record holder was running well below its Croydon form, turning in a flying quarter at the still very respectable speed of 58.21 m.p.h.

The 2.5 c.c. class produced ten Olivers of assorted shapes against four E.D. engined jobs, and reliability was here of a higher order. Once again Alec Snelling put in a cracking couple of runs, turning in nearly sixty for his standing start run and 81.08 m.p.h. with a flying start. George Thornton managed second fastest average with his Oliver Special, 62.15 m.p.h., but in view of the terms of the competition, competitors were not necessarily turning up the taps, but aiming at consistency. The 2.5 c.c. class did in fact produce the winner of the trophy, in the shape of R. Cotterell's Oliver, which was scheduled to average 45 m.p.h., and completed its two runs with an error of only .94 m.p.h.

The 5 c.c. class was less well supported than usual with six entries, of which Jim Dean's Borden did not record times in either round, and fastest flying start run was put in by A. W. Bennett's Dooling Special at 90 m.p.h., with Joe Shelton's Borden second fastest. T. Prest's E.T.A. Special went extremely well to clock 87.37 m.p.h. for the flying run.

Somewhat naturally the 10 c.c. class was awaited with the keenest interest, as very high speeds were expected, but here a comparatively large percentage of "no-runs" were the order of the day, a not unusual feature of early-in-the-season meetings! Such stalwarts as Eric Snelling's B.R.M., S. Honey's Special and G. Redrup's Dooling failed to put in runs, and, in fact, only two cars from an imposing list of speedsters succeeded in beating the "Ton". One entrant at least was proposing to cast discretion to the winds as far as consistent average was concerned, and this was Joe Shelton, whose well-known modified Dooling Arrow had shown terrific form in its practice gallops. It was early apparent during the Dooling's standing-start run, which was hand-timed, that everything was in trim. When it came to the flying start run, the Dooling took some considerable time to "come-in", but gradually the exhaust note hardened to that characteristic ear-shattering howl, Joe rhythmically clicked his watch in time with the blur, and finally gave the "Time-in" sign. It was plain to the spectators crowded three deep round the circle that a sensational speed was coming up, and there was enthusiastic applause when a time of 6.8 seconds, representing 132.35 m.p.h. was announced.

Somewhat naturally this sensational piece of motoring stole the limelight from succeeding efforts, but mention must be made of Arthur Poyser's 'Flying Banana', with its beautifully made and finished gilded bodywork and elongated tail, which went handsomely at 105.88 m.p.h., and L. Tillett's all-home-constructed 10 c.c. scale type car which recorded 83.02 m.p.h. Another consistent runner was L. Manwaring's "Fifty-Bob" Dooling, a car which was won in a competition and subsequently powered with a second-hand Nordec.

During the tea interval Eric Snelling gave a brief demonstration with the fabulous 4-cylinder Austin, which sounded smooth and surprisingly quiet, but was dogged by incorrectly tensioned clutch springs on this occasion.

(Below) American Joe Shelton rhythmically clicks his stopwatch as the Dooling Arrow, seen in a blur of speed to the left of the electric starter, screams round at 130-plus.

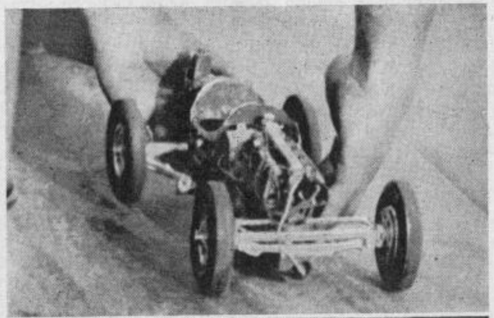
GEORGE LAIRD TROPHY RESULTS

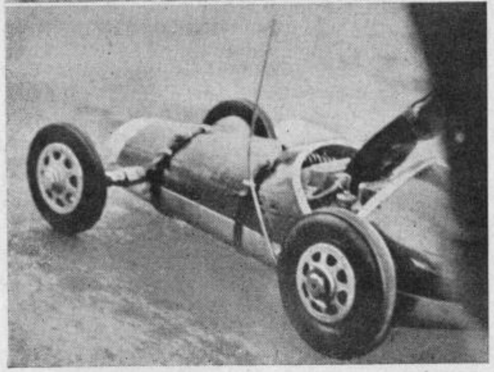
Competitors Name	Car	Est. Av. Speed (mph)	St'ding Start 1st Run Time (secs)	St'ding Start 1st Run Speed (mph)	Flying Start 2nd Run Time (secs)	Flying Start 2nd Run Speed (mph)	Result Av. Speed
1.5 c.c.							
A. Snelling	Oliver	56.0	19.36	46.14	15.46	58.21	52.17
J. Jackman	Elfin Spec.	41.5	22.5	39.11	25.1	35.99	37.55
F. Nash	Elfin Spec.	30.0	N/R	—	—	—	—
R. Ridsdale	Mills Spec.	35.0	N/R	—	—	—	—
2.5 c.c.							
G. Cottrell	E.D. Spec.	40.0	43.76	20.45	N/R	—	20.45
G. Laird	Tiger Bomb	60.0	20.46	43.88	N/R	—	43.88
A. Snelling	Oliver Spec.	64.5	15.1	59.98	11.11	81.08	70.53
A. W. Bennett	Oliver	47.4	19.36	46.14	16.85	53.41	49.77
G. Plummer	Oliver Tiger	50.0	23.6	38.21	13.5	66.66	52.43
L. Newbold	Oliver Tiger	50.0	19.0	47.35	18.3	48.63	47.99
R. Cottrell	Oliver	50.0	81.4	10.22	N/R	—	10.22
G. Thornton	Lago Talbot	50.0	17.5	51.41	17.0	52.94	52.17
R. Ridsdale	E.D. Special	39.0	32.1	28.11	15.52	57.95	43.03
L. Devenish	E.D. Special	55.0	78.0	11.5	N/R	—	11.5
H. Young	Oliver Tiger	40.0	72.6	12.5	N/R	—	12.5
G. Thornton	Oliver Spec.	55.0	15.9	56.23	13.22	68.07	62.15
R. Huggins	E.D. Special	43.0	N/R	—	—	—	—
R. Cottrell	Oliver	45.0	22.0	40.89	17.65	50.99	45.94
5 c.c.							
H. Bassom	Dooling Spec.	60.0	14.76	60.79	12.04	74.75	67.77
A. W. Bennett	Dooling Spec.	68.2	18.78	48.63	10.0	90.0	69.31
J. Shelton	Borden Dooling	72.0	17.75	50.4	10.25	87.37	68.88
T. Prest	E.T.A. Spec.	53.0	15.2	59.19	11.1	81.08	70.13
J. Dean	Borden Dooling	67.0	N/R	—	—	—	—
G. Redrup	Healy Spec.	50.0	124.0	7.26	N/R	—	7.26
10. c.c.							
E. Snelling	B.R.M.	65.0	N/R	—	—	—	—
A. Snelling	Challenger-Dooling	80.0	30.66	29.99	N/R	—	29.99
F. Nash	Own Special	Scratched					
C. Bradley	Conqueror-Special	60.0	N/R	—	—	—	—
J. Shelton	Arrow (Mod.)-Dooling	85.0	35.5	25.42	6.8	132.35	78.83
S. Honey	Own Special	78.0	N/R	—	—	—	—
L. A. Manwaring	Dooling 'F' Type Nordec	45.0	20.5	43.83	16.14	55.76	49.82
S. Newbold	Special-Dooling	70.0	68.55	13.23	N/R	—	13.23
L. Tillett	Own Special	67.0	39.5	23.07	10.84	83.02	53.04
A. Poyser	Special Dooling	80.0	83.6	10.22	8.5	105.88	58.05
L. Devenish	Frypan-McCoy	Scratched					
J. Pickard	Railton-Dooling	75.0	125.0	7.2	N/R	—	7.2
G. Redrup	Special Dooling	80.0	N/R	—	—	—	—
F. Vaughan	Arrow-Dooling	80.0	51.0	17.64	9.9	90.9	54.27
J. Dean	Arrow (Mod.)-Dooling	75.0	20.0	44.98	N/R	—	44.98

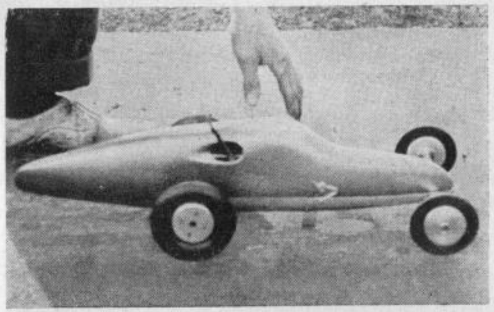
WINNER : R. COTTRELL (.94 error) 2nd : A. W. Bennett (1.11 error) 3rd : L. Newbold (2.01 error)

FASTEST TIME OF DAY : J. SHELTON (6.8 secs—132.35 m.p.h.)

(Below) Diverse types from knee-level. The 4-cylinder Austin, L. Tillett's all-home-built free-lance scale car, and Arthur Poyser's 105 m.p.h. "Flying Banana".







Introduction to Model Car Building

A SERIES BY "PROFESSOR" WHO HAS PROVIDED PRACTICAL CONTRIBUTIONS ON MODEL CAR BUILDING MATTERS IN THE PAST, WHICH WILL ENCOURAGE NEWCOMERS TO THE SPORT AND ENSURE THEIR CONTINUING ENLIGHTENED INTEREST.

Before You Begin

MANY enthusiasts have, only too often, witnessed the somewhat disturbing spectacle of seeing a novice, usually a lone-hand, arrive at the track with a newly "completed" model car, absolutely bubbling over with enthusiasm, and seen this enthusiasm relentlessly replaced, stage by stage, by disappointment, and in some cases, final despair, because certain essentials have been overlooked.

This is all the more distressing to the older, more experienced hands, because it could so easily have been avoided with just a little more thought or attention to detail, but perhaps the greatest danger is to the offender himself, who may be so disappointed that he may not try again.

Perhaps it is thought that the writer is painting an extremely black picture, but if you yourself cannot recollect ever having seen such an instance, it is suggested that you are too wrapped up with the development of your own cars even to notice the novice, let alone help them, with the result that "good material" passes on, unaided before your unseeing eyes!

The older hand has, in most instances, passed through the mill (remember those early days when every car was a potential *non*-starter, and it was just as much fun for you to get the other chap's car going as it was to successfully start your own?), during which time he has amassed a great deal of information, with the result that only too often he fails to appreciate the problems which confront the novice.

On the other hand the novice, who has in all probability had his interest stirred to definite action by witnessing an "Open Day" model racing car meeting, has been impressed by the ease with which these highly efficient midgets are both started and keep up their exceedingly rapid gyrations. In fact, he is so impressed that he too fails to appreciate there is more in the game than meets the eye.

The consequence is, that the novice starts to build his car without knowledge of the requirements it should fulfil and, furthermore, often in his haste gets off on the wrong foot principally due to bad buying in the "bargain basement".

It is not proposed to labour this point. It should be suffice to say that what was considered good constructional practice a year or two ago is not necessarily still good practice. If it is desired to build an "old fashioned" type of model racing car completed with unnecessary mechanical impedimentia, do so by all means, but do *not* anticipate the acme of excellence in performance.

This article is written in the hope that the novice will make some attempt to tie up the loose ends *before* making his "debut". If you have just completed your model, *now* is the time to check it over. Do *not* wait until you get to the track and be responsible for unnecessary hold-ups. If you have not yet commenced construction, so much the better.

In *any* case, do not think you will be immune, whatever the type of car you have made or are contemplating, old-fashioned, scale, near-scale, high performance or purely functional; *all* are concerned. *You* have been warned!

Basic Constructional Rules

Perhaps the best starting point will be a summarised version of the M.C.A. Construction Rules, which may, to the tyro appear formidable. However, they are all based on experience and, furthermore, bearing in mind the special provisions for true scale models, it is much easier to make your car comply in the first instance than to have to alter it at a later date in order to participate in Open meetings.

1. *Capacity Classes.*
   Class 10: I.C. engines exceeding 5 c.c., not exceeding 10 c.c. (0.610 cu. in.).
   Class 5: I.C. engines exceeding 2.5 c.c., not exceeding 5 c.c. (0.305 cu. in.).
   Class 2½: I.C. engines exceeding 1.5 c.c., not exceeding 2.5 c.c. (0.153 cu. in.).
   Class 1½: I.C. engines exceeding zero, not exceeding 1.5 c.c. (0.092 cu. in.).
2. *Weight* of each car in running order with full fuel in tank, exceping bridle if detachable not to exceed:—
   Class 10, 7½ lb.; Class 5, 6 lb.; Class 2½, 4 lb.; Class 1½, 2 lb.

All cars, unless *exact* scale models, which must be *exactly* to scale dimensions, must comply with the following:—

3. *Wheels.*
   (a) Not less than four rubber tyred road wheels.
   (b) Wheels on same axle of equal diameter and type.
   (c) If size differs between front and rear axles, smaller wheels not less than three-quarter diameter of larger at rest.
4. *Layout of Wheels.*
   (a) Approximately rectangular in plan.
   (b) If front and rear tracks differ, narrower not less than nine-tenths larger.
   (c) Wider track not less than 1¼ times diameter of larger wheels.
   (d) Wheelbase not less than 2¼ times diameter of larger wheels.
5. *Drive* by direct mechanical connection between power unit and road wheels or wheel, when in motion.
6. *Exhaust* outlets arranged to prevent direct discharge on to the track.
7. *Body.* All cars must be equipped with, and race in competition with, a body complying with the following:—
   (a) Engine, gears, etc., to be generally within the limits of the body and invisible when car is viewed centrally from axle level in side, front and rear views.
   (b) Spark plugs, glow plugs and exhaust pipes permitted to protrude *within reason* subject to decision of scrutineer.
   The only major exception to this rule is the case of a scale model of definite prototype, e.g. "Shelsley Special", in which case, clear photograph of original must be produced for comparison.
8. *Tether or Bridle* attached to car in such a manner to be capable of withstanding loads as follows:—
   Class 10: 65 lb. per lb. of car weight. Class 5: 45 lb. per lb. of car weight. Class 2½: 28 lb. per lb. of car weight. Class 1½: 21 lb. per lb. of car weight.
   Length of tether not less than 9 in. or greater than 10 in. from apex or connecting hole to main centre line of car.
9. *Stopping Device* capable of stopping engine whilst car in motion either by switching off ignition, fuel, or both.
10. *Running.* (a) On all four wheels as far as possible, i.e. intentional tethering to produce inner or outer wheel "lift" is barred; (b) all parts securely fastened when running. Any car dropping major part, excluding tyres, shall be disqualified from that run unless timing has been completed.
11. *Compliance with Rules.* All cars to be inspected for compliance before racing *and run in same condition.*

Replacement of any part which fails at discretion of scrutineer, provided car still complies.

Subject to compliance, tyres, glow or sparking plugs, batteries, etc., may be changed without permission.

Mechanical & Physical Considerations

The tyro having digested the foregoing rules, and checked his own car, or plans, for compliance can now pass on to the mechanical and physical considerations which so often provide the pitfalls.

It is perhaps unfortunate that these are so interdependent one upon the other that it is impossible to provide a logical sequence. However, excellence of performance is only achieved with the ideal combination of all the factors, and they must therefore be regarded as all being of equal importance.

Basically, a model racing car consists of an engine which provides the power, which in turn is utilised via gears and wheels to drive the car around the track. It therefore follows that, all other things being equal, the fastest car will be that with the highest powered engine. In practice, however, all too often "all other things" are not equal, and the first point to be appreciated is that the deciding factor is the amount of power which can *usefully* be accommodated within the car.

Consider two *correctly geared* model cars. The first has been built to robust proportions, the novice having been assured that since the cars are run on level tracks weight is of no importance, whilst the second is a really lightweight, in fact featherweight, effort—holes drilled everywhere, including the tether lugs! —the novice having here taken a page from full-size practice. Each car, however, gives a disappointing performance on the track. The former proves sluggish with engine groaning out objections, whilst the latter makes little real progress either, with engine screaming abuse, and the smell of burning treads.

Analysing these results, the former car appeared to be rooted to the spot, whilst the latter seemed unable to grip the track, and this provides the key to the problem—adhesion.

Weight & Adhesion

Somewhere between the heavyweight and ultra-lightweight car there must, therefore, lie the correct or optimum weight which governs the amount of power which can usefully be transmitted to the track.

Adhesion is, then, dependent upon the weight on the driving wheels and also what is termed the "coefficient of adhesion" between the tyres and cement track. The value of the latter is not a constant, but varies according to the condition of tyres and track, the value for dry conditions is approx. 1.0, whilst for a wet track it varies between 0.5 and 0.6, depending upon the condition of the tyre, and under wet conditions with very oily track is, as most experts will agree, almost non-existent.

The "coefficient of adhesion" U when multiplied by the weight on the driving axle gives the actual force which can be applied to the track, and if this product is in turn multiplied by the wheel radius, the result is the maximum transmittable torque.

From this expression, taking the actual speed of the car into consideration, a further expression can

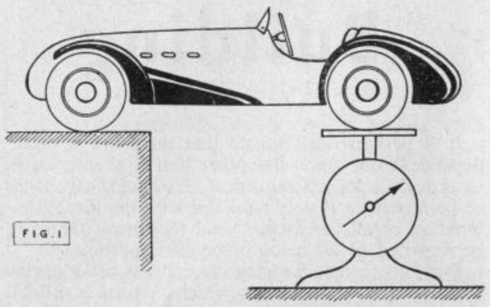


FIG. I

METHOD OF FINDING WEIGHT ON DRIVING WHEELS

be deduced for maximum transmittable horsepower, i.e. :—

$$\text{Max. Trans. H.P.} = \frac{W \times U \times V}{375}$$

Where W = weight on drivers (lb.)
U = coeff. of adhesion.
V = speed in m.p.h.

It is naturally desirable to absorb all the available brake horsepower of the engine at the anticipated or actual speed of the car, so that rearranging the formula, an expression can be derived for the optimum weight on the driving wheels.

$$\text{Optimum weight (lb.)} = \frac{375 \times \text{B.H.P.}}{U \times \text{M.P.H.}}$$

In actual practice, it is found that an adjustment can be made to cope with weight transference which occurs when the car is at speed, either increasing or decreasing the weight on the driving wheels, depending on whether the car is rear wheel drive or front wheel drive respectively.

A rough allowance can therefore be made if so desired by adding to the above optimum weight in the case of the F.W.D. car (or subtracting in the case of a R.W.D. car) an amount equal to the product of the optimum weight times the wheel radius divided by the wheelbase.

In the case where only one wheel is to be employed as a drive, then the optimum weight (or modified optimum weight) must be applied to this wheel, which means in most instances, that twice this weight will have to be concentrated on the driving "axle"

Checking Weight on Axles

To find, or check, the weight on the drivers (fi.1.) set up the car with driving wheels resting on the pan of household scales (or supported from axles by a spring-balance) and free wheels resting on a firm foundation so that the car is approx. horizontal. Reading gives weight on drivers. Procedure can be reversed for weight on free wheels, and total of these two quantities should, of course, equal total weight of car.

Alternatively, if the tether point, wheelbase and total weight are known, weight on drivers will be equal to the product of total weight times distance of tether from the "free" axle, divided by the wheelbase.

It is perhaps easier to make the car a little on the lightweight side, since, for final adjustment, weights can then usually be added at the longitudinal tether point, thus not affecting the balance and therefore the same bridle can be used for each trial. If the car is initially too heavy, there is usually a limit to the amount of weight which can be removed at the tether point, and therefore a new bridle becomes a necessity for each separate test, unless, of course, weight can be removed equally on both sides of the tether point.

Before leaving the subject of weights, even distribution of the total car weight between the four wheels (almost ideal in full-sized practice), gives the highest figure for rolling resistance, whereas it is at the minimum with all the weight on the drivers. It is therefore logical to concentrate as much of the total weight as possible on the driving wheels, bearing in mind, however, that stabilising weights are sometimes a necessity.

(*To be continued*)

BARRIER CREAMS

NOWADAYS there is no possible excuse for the ardent model maker to carry unseemly evidence of his weekend work in nails and knuckles back to the disapproving austerity of his city office. Prevention is far better than cure, and we have for some time now been using barrier creams that are rubbed into the hands *before* the dirty work, and prevent any hard-to-move filth becoming ingrained. The grave shortage of domestic help in these days has recently encouraged the ladies' cosmetic manufacturers Innoxa to produce a special barrier cream of their own. We were supplied with samples, and have now had an opportunity of testing them in normal—that is "ordinary" rather than freak—use. The "dry" cream, for use before dry work, was passed to the girl engaged upon that dirtiest of all office jobs—working the stencil duplicator, and did all that was claimed for it. It reposed then in the glove pocket of the car, until a puncture en route for an important meeting proved its value again—and we were able to appear still quite immaculate, if late. More sensational is the "Innoxa 71" now on the market in tube form for "wet" work. This we have tested while stripping distemper from the bathroom with a really strong solution of sugar soap. The first evening we made a start unprotected, and gave up with sore hands after two hours. Two days later, with hands recovered, we rubbed in "Innoxa 71", and finished the job unscathed with an even stronger caustic mixture. We shall always keep some in the house in future !

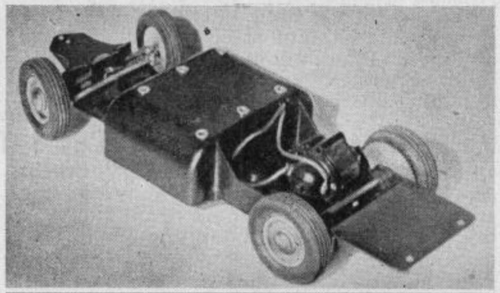
VAUXHALL VELOX ENDURANCE TEST

RARELY, in these days of austerity, waiting lists and Export-Only labels, does the opportunity come our way to test, to destruction if necessary, a brand new car bearing a famous name. Great was the excitement of our Motoring Correspondent, therefore, when the makers offered *Model Maker* a new Series E Vauxhall Velox, on just these terms, and the arrival of the test car was awaited with the keenest anticipation.

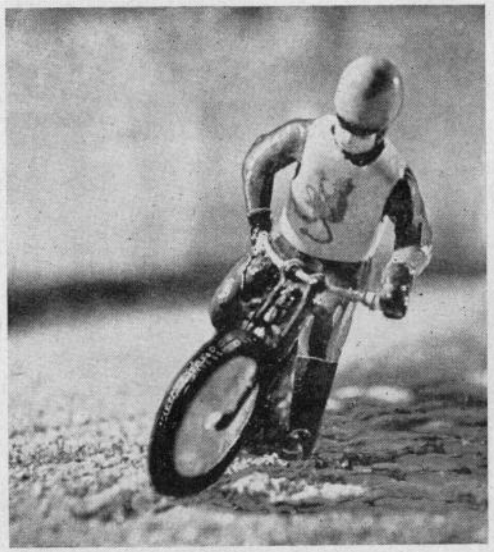
In due course it was delivered to the office, a right-hand drive model, very spick and span in blue-green with beige upholstery and cream wheels. The staff turned out to admire the new arrival in force, and our Tame Motoring Man became a little above himself, loudly mentioning the names of two daily press motoring correspondents to whom he once spoke, in a milk bar. He was seen to be furtively studying the maker's handbook from time to time, nevertheless.

Several views of the Vauxhall Velox and its chassis, in one of which Our Man will be seen examining the interior appointments. The motor control will be seen ahead of the near rear wheel.

It was arranged to take the Vauxhall to a nearby closed circuit with a view to carrying out long distance endurance, road-holding and consumption tests, and the car was accordingly checked over carefully, lubrication carried out, and a full load of fuel taken aboard. The necessary timekeeping equipment and cameras were loaded up, and a course set for the circuit. When all arrangements were complete and the motor warmed up carefully, Our Man took over, and the Velox was sent away to lap the circuit at maximum speed until further notice, or until the car called it a day, whichever was the first to happen.



Steadily the car circled the course, piling up the laps with monotonous regularity and in almost uncanny silence, the only sound audible to the timekeepers being the slight whistle of the tyres and a trace of hum from the gearbox. After half an hour it was noticed that a rather wild line was being taken on one part of the circuit where it skirted a dangerously solid barrier, and some anxious moments were experienced when the car momentarily ran out of road, Our Man having apparently been lulled into a sense of false security by the trouble-free running of his charge. The Velox was successfully brought back on to course, however, without spoiling a "non-stop". The Hour came up with no change of engine note, and the car running magnificently, still on full bore, and so far as the watchers could see, no signs of dangerous tyre wear. On and on sped the Velox, the clocks recorded ninety minutes, an hour and forty, one hour forty-five — suddenly an air of tension made itself felt among the watchers. One sensed that something was going to break—as one hour forty-eight minutes came up there was a sharp crack—Ron Moulton of *Aeromodeller*, hurled down his pen, swung round at his desk and snarled, "If



Something New in Table Top Photography

THE combination of model making with the art of table-top photography often leads to the production of charming models of unconventional subjects, not to mention the use of unconventional materials, since the model is generally regarded largely as a means of achieving an effect. A case in point is the little speedway rider illustrated here, which is the work of R. J. J. Westlake of Crownhill, Plymouth, who is a follower of the fortunes of the Plymouth Speedway.

The scale of the model is 1/25th full-size, and construction is mainly of wire and balsa. The frame of the machine is made from a single piece of 16 s.w.g. copper wire, as are the front and rear forks, these being soldered to the frame. The front forks are braced with 10 amp. fuse wire, and the handlebars are of 18 s.w.g. copper wire with balsa twist grips. The engine components, consisting of crankcase, cylinder, head and carburetter, together with the gearbox, are made separately in balsa and assembled in the frame.

The wheel centres are of clear "Perspex", with the spokes simply represented by scribed lines, afterwards painted black. The tyres are cut from plywood, with grooves to represent treads. The realistic Bowden cable controls are made from 10 amp. fuse wire. Frame, forks, etc., are painted black, engine silver and the tank red.

The rider is made from balsa, the limbs being made separately and attached to the body to give the correct riding attitude. The rider's gauntlets are drilled and slipped over the handlebar ends. After fixing the limbs to the body in the correct position on the machine, the rider was removed and covered with tissue painted to represent his leather clothing, the jacket being finished in the Plymouth colours of red with the yellow "devil" emblem. The complete model is finally coated with clear varnish.

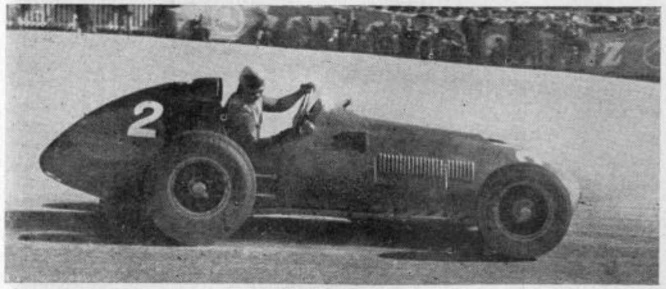
The safety-fence in the background is made from a strip of celluloid, supported by wooden strips and painted with black lines, the "crowd" impression being achieved by painting the figures on card positioned behind the fence. The track surface consists of fine bird-grit, the stream of sand from the rear wheel being effectively simulated by cutting a piece of celluloid to shape and glueing sand to it. In the photograph by F. Tayler which we reproduce, the front wheel and background were deliberately thrown out of focus in order to give the impression of speed.

VAUXHALL VELOX ENDURANCE TEST (*Continued from page* 443)

you don't stop that darned thing going round the floor right *now*, I shall go and work in the post-room." Almost simultaneously with this outburst of literary temperament, the three Eveready U 11 batteries in the Victory Industries Ltd. 1/18th scale model began to fade, as with 1 hour 48 minutes on the clock the run came to an end. The engine cover was rapidly removed and the tiny geared Mighty Midget motor examined for signs of overheating, and found to be as cool as when it started. Distance covered was approximately 4.2 miles, at an average speed of 2.4 m.p.h., and a running cost of a little over 2d. per mile.

The model is a handsome little job, with moulded plastic bodywork and chassis, the authentic lines being vouched for by close collaboration with Vauxhall Motors Ltd., who have given the scheme their blessing. Limited numbers of these and the sister models of the new Morris Minor are available for the home market, the bulk of production going overseas, mainly through the big car dealer organisations. The Vauxhall retails at £2/1/6d., the Morris at 39/6d., and the geared motor itself at 14/3d., inc. purchase tax.

Specification includes reversing gear, operated by a two-way switch beneath the car, Goodyear or Firestone tyres, Ackerman steering, and geared drive to the off-side rear wheel, the step-down ratio being $6\frac{1}{4}$: 1. Consumption is very low, and even after its lengthy test run the car we tested was game for further running after the batteries had been given time to recover. The makers of these attractive miniatures are Victory Products (Surrey) Ltd., Barfax Works, Worplesdon Road, Guildford.



PROTOTYPE PARADE NO. 39

The $4\frac{1}{2}$ Litre FERRARI

DESCRIBED BY G. H. DEASON

Photos: "Autosport"

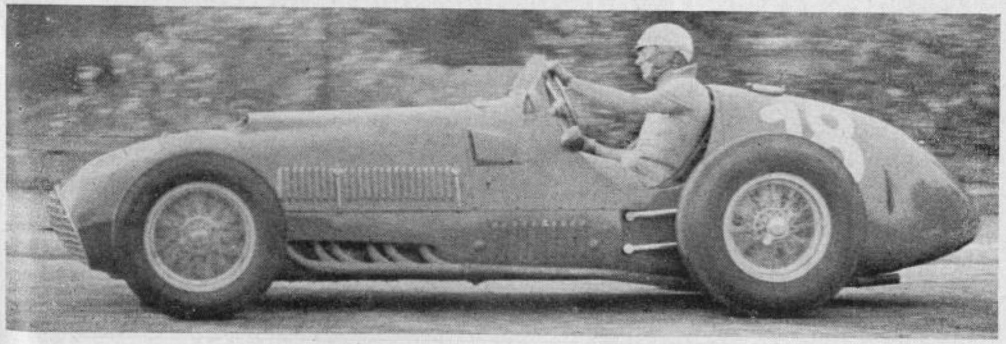
RACING enthusiasts will doubtless remember that Ferrari first came before the public eye as a *marque* in its own right when the very fast and light, short wheelbase $1\frac{1}{2}$ litre car, fitted with a supercharger, was seen in Grands Prix as the principal antagonist of the Maseratis, at a time when the Alfa Romeo had made a temporary withdrawal from the lists in Formula I events. A car of this type was seen at Silverstone in 1949, running under the name of the Thinwall Special, then driven by Raymond Mays for its sponsor, C. A. Vandervell, of bearing fame. These $1\frac{1}{2}$ litre supercharged cars were the subject of No. 23 of "Prototype Parade", accompanied by a drawing by Harold Pratley (*Model Cars*, September, 1950).

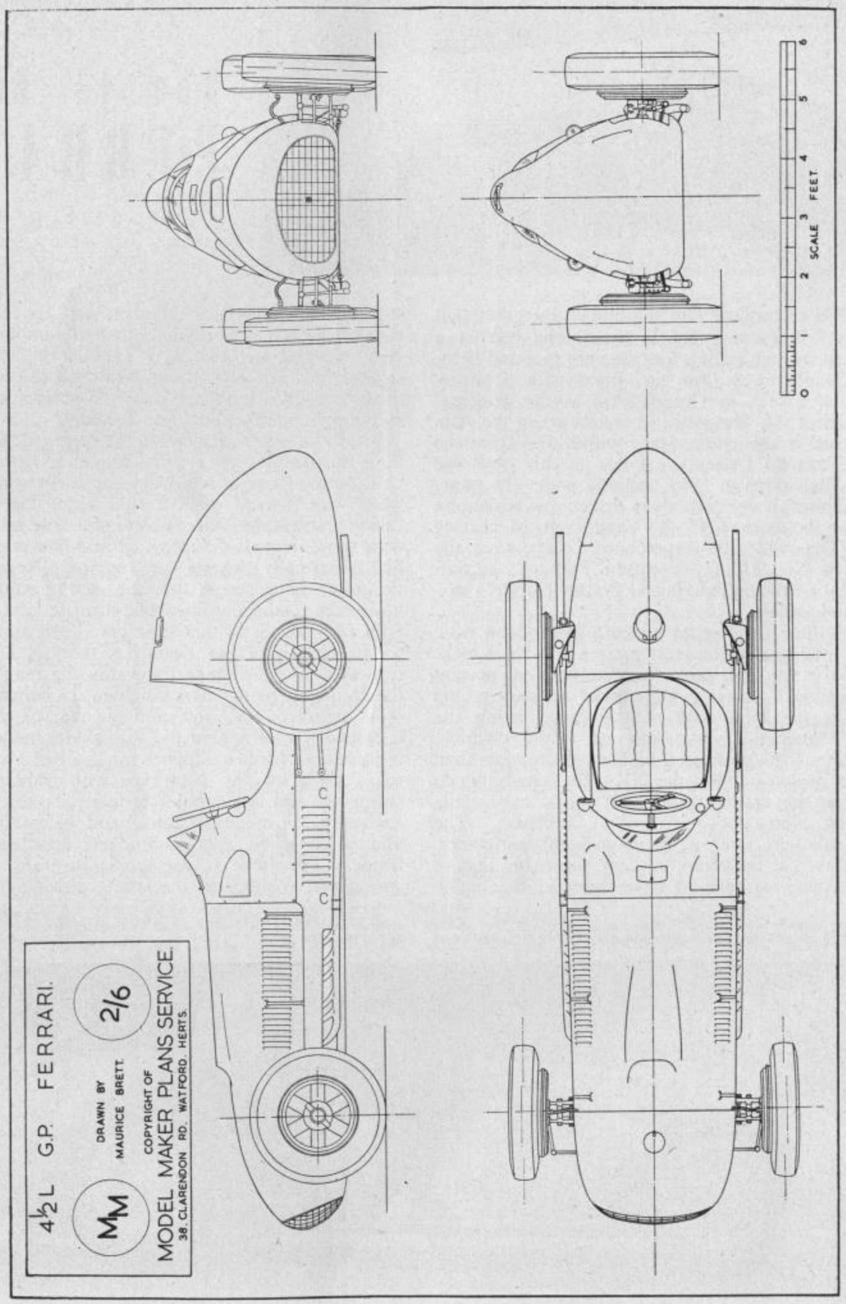
At this time the Ferrari concern at Modena were not only engaged in the racing game, but were making a bid in the high performance sports car market with a series of sports models based on their racing machines, the high note of the range being the Ferrari "America", a two-seater of 4.1 litres which, when announced, claimed a higher performance than Britain's pride and joy, the XK 120 Jaguar, which ranked as the fastest production sports car in the world by virtue of its runs at Jabbeke. The "America" was, and is, a magnificent performer, and it was not, therefore, so very surprising that in 1950 Ferrari was seen to have deserted the highly stressed blown $1\frac{1}{2}$ litre category, and appeared with new cars of $4\frac{1}{2}$ litres capacity, running unblown. The cars still retained the V-12 cylinder layout of the smaller blown jobs, with one camshaft to each bank, fitted into chassis longer than the smaller cars, but still commendably short and handy.

From the point of view of the racing designer the large unsupercharged type had much to commend it, both on the score of reliability and fuel consumption, which was proving such a vital factor that the virtually obsolescent Talbots were still able to compete with some degree of success in first-line racing, despite a basically "sports car" engine. Nevertheless, the immediate success of the new Ferraris must have come as a considerable surprise, not least to Alfa Romeo, up to that time practically unbeatable.

The chassis of the Ferrari is tubular, having an oval section which tapers towards the rear, as does the frame in plan. Much-lightened channel-section cross-members are used, and the rear of the frame is extended well behind the axle shafts, under which it passes, to form a support for the fuel tank. The rear axle is of De Dion type with transverse leaf springing, and two tubular radius rods are fitted on each side, terminating above and below the hubs, and pivoting on special brackets attached to the frame. The front suspension is by transverse leaf spring and wishbones, the spring passing below the

(Above and below) Two "profile" photographs of the $4\frac{1}{2}$ litre un-s/c Ferrari, which clearly show the modified shape of the tail in the latest version, seen below in the hands of Villoresi during the Swiss Grand Prix at Berne in 1951.





front cross-member.

The big V-12 cylinder engine, as might be expected, entirely fills the bonnet, and the positioning of the triple Weber carburetters between the cylinder banks makes it necessary to house the air intakes in a tunnel which is in turn housed in the long air scoop on the bonnet top. The latest cars have dual sparking plugs, the magneto for which is of aircraft type, mounted at the front of the engine. The radiator element is set low down in front of the front cross-member, and the steering column passes on the offside of the engine at an angle, there being a universal joint behind the steering box. Six-branch exhaust manifolds sweep down to single tail pipes on either side below the body.

A four-speed gearbox is in one unit with the rear axle casing, which is of the double reduction type, and the gear lever is carried in a visible gate on the left of the cockpit. Brakes are hydraulic, with two leading shoe action, and the brake drums are distinctive in having wide ventilating "spokes" which are visible through the wire wheels. The backs of the back plates are perforated and have gauze mesh covering the ventilator holes.

The engine itself is finely finished, with wide camshaft covers with cast-in tunnels for the high tension leads to the plugs.

Externally the car looks more purposeful than beautiful, probably due to its long wide "snout" with the unmistakable Ferrari "egg-box" grille, and the rather heavy-looking tail, which, however, serves to enhance the car's chances of victory due to its fuel carrying capacity. Air scoops on the scuttle sides and a hinged ventilator flap on the scuttle top serve the cockpit, and a filler cap on the top of the tail hinges forward. The rear-view mirrors are streamlined by semi-circular fairings, and shallow fairings also cover the front ends of the radius rods.

Twenty-four extractor-type louvres are cut in each side of the lower edge of the engine covers, eleven similar ones appear on each side of the body below the scuttle, and single slots face forward in the tail behind the rear edges of the back wheels. In some cases the cars have appeared with flat aero screens hinged on side brackets, while at others have appeared with fixed screens of curved pattern.

The new cars were an immediate success in Formula I, and although the 1951 version had modified cylinder heads, 24 plugs and modified braking, it was with the older 12-plug version that Froilan Gonzalez gained his magnificent victory at Silverstone in the British Grand Prix in July, 1951, being the first driver to lap the Northants circuit at over 100 m.p.h., a feat he achieved during official practice. By sheer brilliance of driving he defeated both the official Alfa Romeo team and his own team mates Villoresi and Ascari, who were driving cars of the newer type, which during the season scored a number of victories over Alfa Romeo, notably at Nurburg, San Remo and Monza. The new models were by this time developing some 370 b.h.p., against the 400-plus of the Type 159 Alfas, which, however, was not always fully usable except on the fastest courses.

(Above) The earlier twelve-plug engine, which had dual magnetos at the rear. Note the intake tunnel and off-set steering column.

A fine shot of Alberto Ascari, face covered with oil, taken during the Spanish Grand Prix at Barcelona, which gives an excellent view of the front end and air scoops.

DOPE & CASTOR

By JERRY CANN

AN excellent piece of news heard at the recent Edmonton Open Meeting was that of the very active revival of the Chiltern M.C.C., who have resurfaced their full-sized track at Woodside, near Luton, and report it to be in first-class condition. This is especially good hearing, in view of the closing of the Eaton Bray track, for enthusiasts in the Herts, Beds and Bucks areas, where it looked as though there would be no running facilities this season. Like Eaton Bray, Woodside is a very pleasant spot on a fine summer day, with plenty of open spaces for the racing man's family to picnic peacefully, whilst Pa is in the thick of the fray. I hear that there is a possibility of an Open date on Whit Monday, in the old tradition, but it will be too late to include confirmation of this in *Model Maker*, so intending visitors would be advised to contact the Hon. Secretary, K. Davies, 12 Meadow Way, Caddington, Luton. I hear also that P. D. (Dan) Macdiarmid is once more taking an active part in club affairs, and is Chairman of the club. (*Stop Press*! Open Day June 22nd.)

The Chiltern Club has always had a weak spot for the smallest size in racing models, and there were quite a brood of under 1.5 c.c. models running at Woodside long before the class came into being officially. It will be interesting to see if any record contenders in this category hatch out in the Luton area. Incidentally, Mac himself showed me the "makings" of a most charming little scale job in this class some time ago, which should have come to fruition by now.

The "One-Fives" as a whole can hardly be said to have distinguished themselves so far this year on the score of reliability, which is a pity now that they have a class to themselves. Perhaps it is hardly fair to criticise at this early stage, but it might be better to aim for reliability first, before going out for phenomenal speeds. After all, rorting noises in the pits and "no-runs" in the comps. don't impress anybody very favourably, and it is most necessary that organisers should be encouraged by good entries and consistent performances to include this class in their programmes.

The annual "Grand Prix" for the real craftsmen amongst the 5 c.c. builders is the Sutton Trophy, awarded each year for the best home-built model in this capacity class. The holder has the right to nominate the venue of the next year's competition, which this year will be held during the Surrey M.R.C.C.'s meeting at the Edmonton track on September 14th. You have been warned. For full particulars of the regulations apply to the Hon. Secretary, Model Car Association, but to recap briefly, cars must, with certain minor exceptions, be the sole work of the entrant. Speed is not a deciding factor, the only stipulation being that the competing car must be capable of covering a quarter-mile under its own power. An excellent and deserving affair, giving a chance to the back-room boys whose pleasure is more in the making than the racing of car models. It seems a pity to limit this form of event to one class only. The standard of work is very high, and the present holder is Cyril Field of Reading.

A list of forthcoming Surrey Club meetings to hand during April was a little late to allow the inclusion of any but the Dean Cup and Shelton Trophy affair on this page. By the time these words appear in print the Z.N. Cup, May Cup and Tiny Cup events will have been lost and won. The remaining competition, to be held at Edmonton on June 15th, is an "All-out-speed" event for all four classes, with no restriction on fuel, the Tens running for the Dean Trophy and a prize of £5, and the Fives for the Shelton Cup. Prizes of £3 and £2 are offered for the Two-fives and One-fives respectively. Invited clubs are Edmonton, Medway, Portsmouth and Maidenhead, and practising starts at 10.30 a.m. Competition Secretary is H. Brookman, 32 North Lane, Teddington.

The newly-formed Sheffield and District M.C.C. took part in the local Hobbies and Handicrafts Exhibition after Easter, organised by the Sheffield Society of Aeromodellers. J. A. (le Patron) Oliver of "Tiger" fame, judged the car section, and gave valuable advice to members. In the evening the club staged running demonstrations at two-hourly intervals on a temporary track in the corner of a school yard, on which FTD went to a 2.5 c.c. Oliver twin-shaft motor in a Tiger-Bomb casting.

Important Note.—The M.C.A. National Finals, which were scheduled to take place at Nottingham shortly, perilously close to the Italian meeting at Monza, in which several British competitors are to take part, has now been re-sited and re-dated. The M.C.A. Champs. now happen on August 3rd at Cleethorpes. The East Coast is so bracing! An additional date for an Open meeting is that of the Bolton Club, fixed for June 1st at Leverhulme Park. You may just have time to drop your copy of *Model Maker*, grab your hat and pushstick and turn up for the second round!

There is likely to be considerable interest in the neat little 1 c.c. engine, the construction of which W. W. Ransom starts to describe in this issue, for it is of a size and type which fits in with many modelling schemes calling for a sound reliable power unit, not least the production of an "all-my-own-work" rail-racer, whilst it should fit nicely into the Editorial Le Mans M.G. recently described. Readers will be sorry to hear that the engine's designer, Arthur Weaver of the North London Society of Model Engineers, has been ill for some time and has been laid off all modelling for the time being. Here's wishing him a speedy recovery!

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