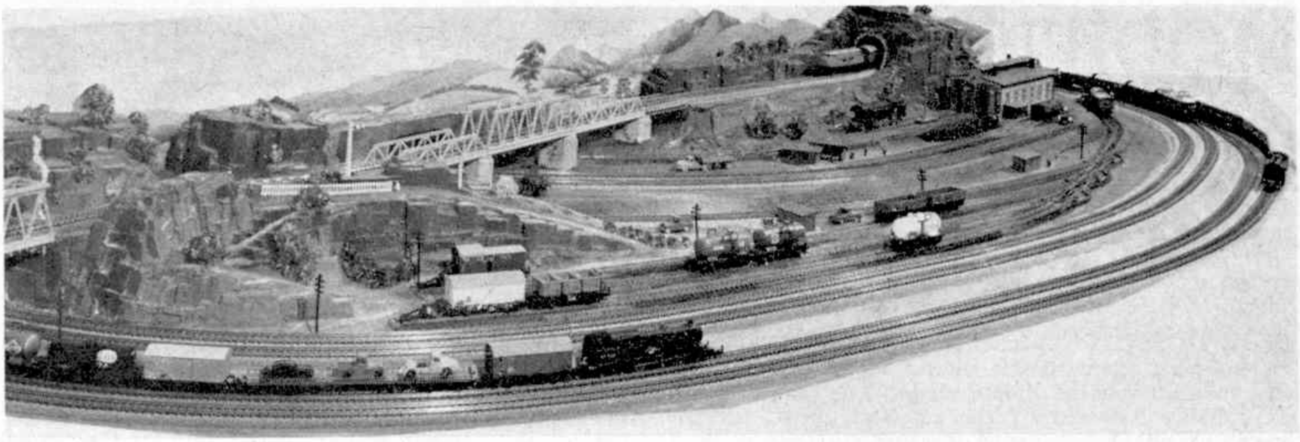


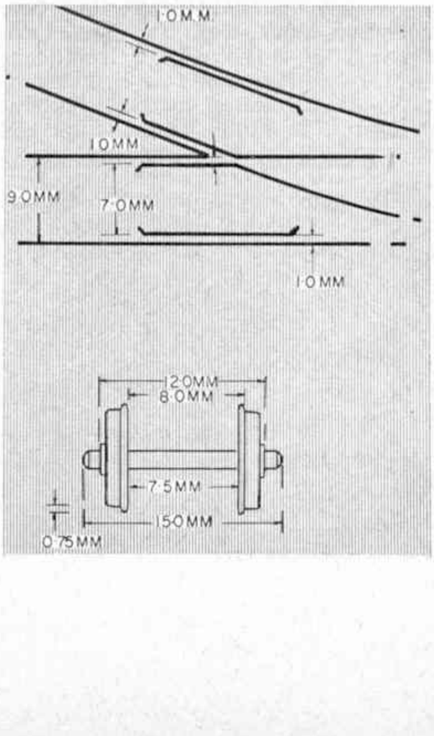
BUILDING AN "N" GAUGE LAYOUT

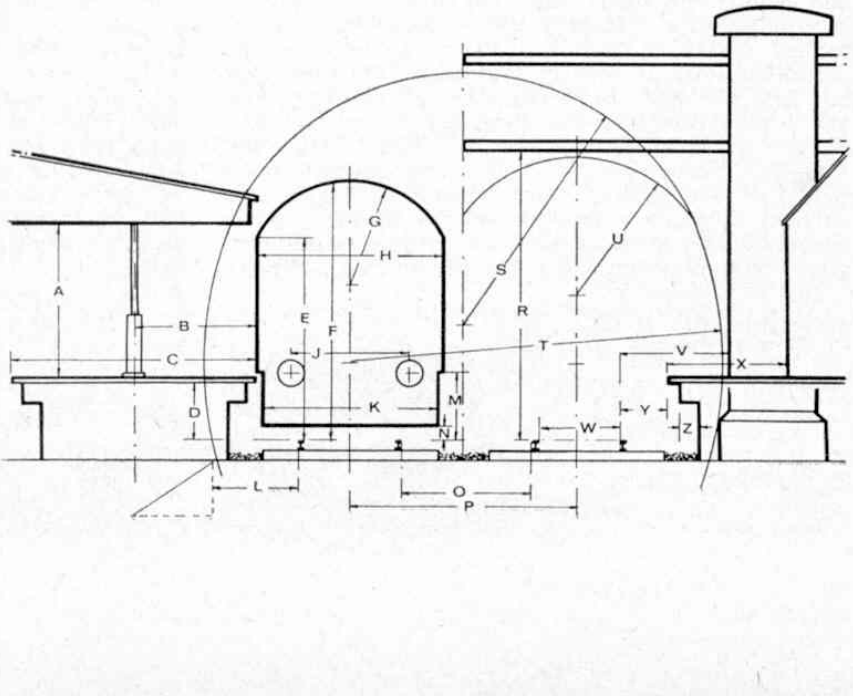
A new series by P. Tomlinson

Part I—Why 'N' Gauge?

IF YOU own a train set, sooner or later you will get the urge to extend it into a proper model railway, and so at the outset it might be as well for me to define exactly what a model railway is.

At one time the possession of some scale models was considered quite enough evidence of a scale model railway, but now that the majority of commercial trains are in themselves scale models, this distinction no longer applies. Possibly the best distinction would be to say that a scale model railway is authentic in as much as every individual model is appropriate in its setting. For example, you would not provide a small single track station with a large Euston-type Doric arch, nor would you model a large terminus with a couple of wooden shacks. If possible the track layout should be a reasonable copy of prototype practice, not





only because of the appearance, but also because prototype practice in track layout is the result of years of practical experience in building stations which must be worked as easily and efficiently as possible.

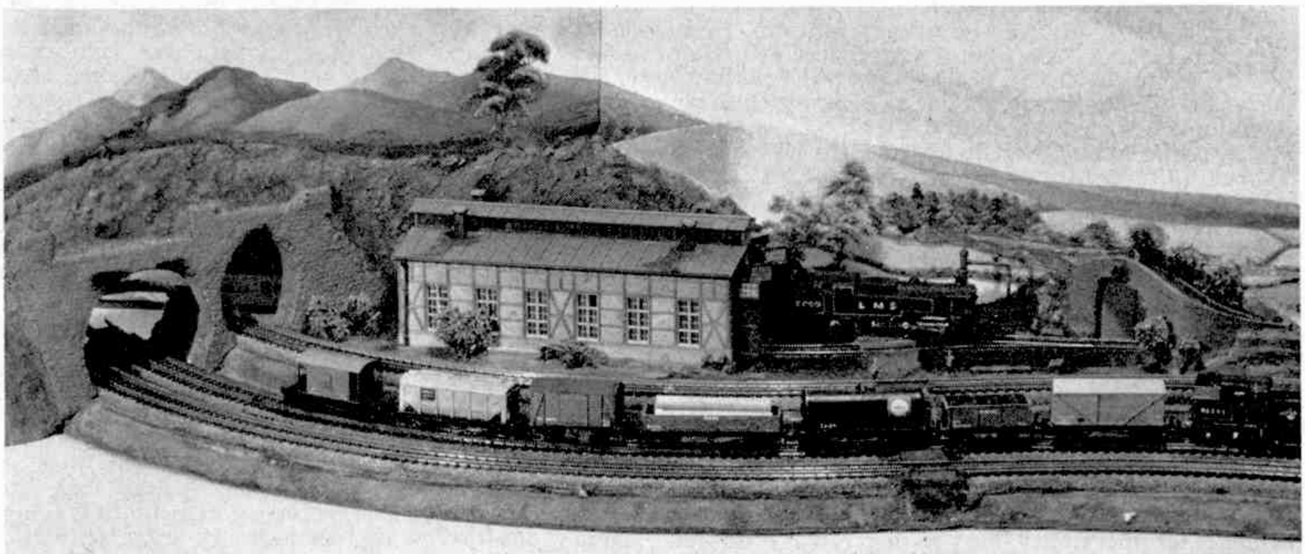
It therefore follows that the main essential of a model is a good layout plan, but before we explore this topic, it might be as well to decide which scale to work in. No doubt many of you will already be committed to a particular scale, but there will be others who have not yet made up their own minds on the subject.

This problem of which scale to work in is definitely related, of course, to the kind of space there is available and also to the amount of money you can afford to devote to the layout. These, however, are only two influencing factors, and for instance, there will be those of you that like to plan a complete miniature countryside round the railway, while others will be quite content with a terminus station and loop on which to despatch and receive traffic. Finally, there will be those of you that have little interest in anything beyond locomotives and rolling stock, and their construction.

twelve coach trains on the sort of baseboard previously used for the toy train set. In such a small scale it is now possible to think of building a true model of a railway, and also of the first time, scale models of some of the larger buildings and civil engineering structures become a practical possibility.

Due to its very smallness, this new scale will attract many people to the hobby who have never modelled railways before, and who will require some basic ideas on modelling particular items. Also, experienced modellers who have "reduced" from the larger scales may require assistance in adjusting to working in a smaller scale. Therefore, I have reproduced in this first instalment, a useful drawing giving the loading gauge dimensions of N gauge, together with those of the prototype British Railways. The dimensions for structures, tunnel clearances, and bridge heights are minimum ones, and all the measurements are in accordance with British Railways standards charts.

For the benefit of those who like to make their own track, I have presented opposite, a drawing giving track and wheel standards for 2 mm. to 1 ft. scale,



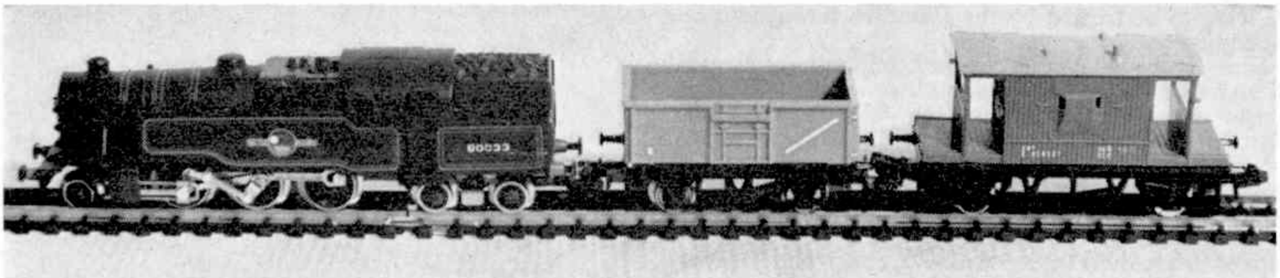
At the present time there are virtually six different scales and gauges available commercially. Of these six, O-gauge may be ruled out on consideration of size and availability, and also the high cost of commercial items. HO gauge is similarly less well catered for, although there is a considerable amount of equipment used in this country originating from the continent and the U.S.A. TT gauge, so popular only a few years ago, has unfortunately become virtually extinct where newcomers to the hobby are concerned, which leave us with the well established OO gauge, the up-and-coming OO narrow gauge, and the relative newcomer—N gauge. Of the first two—particularly the former—much has been, and is being, written, and therefore in this series of articles I propose to describe in detail the construction and operation of a small N gauge layout.

One main advantage of N gauge over the other scales is its small size. In fact, it is the smallest of the commercial model railways using nine millimetre gauge track (hence "N" gauge) with models built to a scale of two millimetres to one foot. Quite a lot of railway will go into the space available to the average person and in fact, it is quite possible to model a medium size station and also to have scale length

based on a number of measurements taken from various commercial items of different manufacture. In presenting these standard dimensions, it cannot be stressed too strongly that they are only recommended figures. There is nothing agreed about them at all, but they have been calculated to give the best possible trouble-free running and interchangeability within the gauge, mainly with considerations of commercial manufacturing. There is nothing whatsoever to prevent a modeller working to dead scale if he wishes, provided that he is prepared to operate on large radius curves with everything else in proportion.

Next month I shall be discussing the design and construction of the baseboard, followed by some ideas on designing suitable track plans. Although the natural order of these two subjects might seem to be the wrong way round, I hasten to add that as I have somewhat limited space available, I prefer to build the baseboard first and then plan the layout to fit, despite the fact that it is far more preferable to design the layout plan first.

Finally, should anyone have any ideas, comments or questions concerning N gauge, I shall do my best to answer these in future articles if they care to write to me, c/o the Editor.



BUILDING AN "N" GAUGE LAYOUT

Part II

Construction of the Baseboard

by P. Tomlinson

I hope, in this article, to explain in simple terms a method of baseboard construction that is both efficient and also easy enough for anyone to tackle with confidence. Before talking about this, it might be as well to take note of three rules which, if carried out conscientiously, will save time, temper and trouble.

1. **Measure twice and cut once.** Observance of this elementary rule could save much otherwise wasted wood.
2. **Keep all tools sharp.** Remember that a blunt chisel under pressure is more liable to slip and possibly cause a serious accident.
3. **Take your time.** A sound baseboard is essential to a successful layout. Never be tempted to skimp either materials or work, or after a few weeks you may find trackwork sagging or loose, and your time and money wasted.

The timber required for even an average size baseboard is considerable, and in view of the cost I am certain that anything over 2 in. by 2 in. is unnecessary. A great deal of 2 in. by 1 in. timber can be used, if joints are soundly made and the design and bracing are good. Fig. 1 gives a clear indication of the types of joints most used and you will be able to decide which best meets your needs. Broadly speaking the rule is to use 2 in. by 2 in. for legs and their supports, and 2 in. by 1 in. for cross-rails and top construction.

When buying timber, you will find that prices vary considerably and it will pay you to shop around before buying. Remember that it may be better to deal with someone who sells to the general user, rather than the building trade. Such a dealer may prove helpful in many ways.

Where the top of the baseboard is concerned, you must choose between laying track on lengths of ½ in. thick wood fixed only where the track is to be laid, filling in the other spaces with scenery (known as an open-top baseboard), or completely covering the framework with one of the various possible materials. Personally I prefer the solid top because it is more versatile in that re-laying, enlarging and general improvements can be done with the minimum of disturbance. Such a top also provides a firm anchorage for scenery at any point required. It is virtually essential for a portable layout because it prevents any distortion of the framework after rough handling. Assuming that you decide to build a solid top we can consider the four following recommended materials.

1. *Hardboard.* This is not particularly suitable because of its tendency to warp or twist over unsupported areas. It is the cheapest of all possible materials although this is somewhat offset by the need for additional supports. It will not readily take pins unless a hole is drilled first.
2. *Pulpboard.* Often referred to as Soft Board, this is about ½ in. thick, of soft texture and again requires adequate support. It possesses good sound-deadening properties, but will not hold pins and screws firmly.
3. *Plywood.* ½ in. or ⅜ in. ply is a most excellent material, but it costs considerably more. On the other hand, only a small amount of support is needed. It is

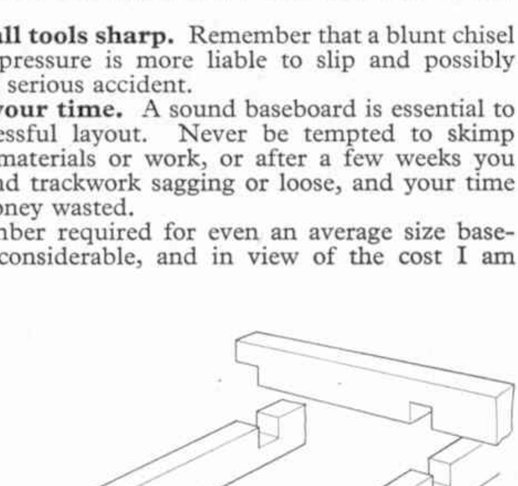


FIG. 1

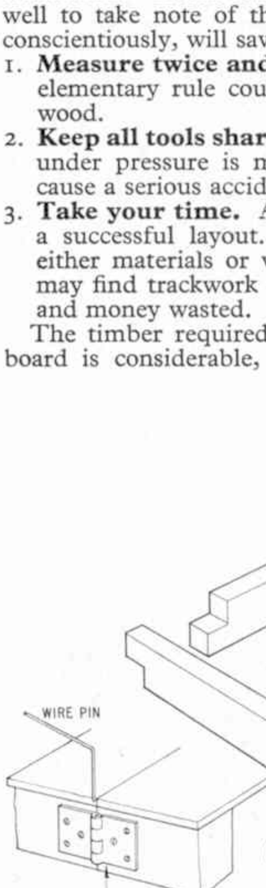


FIG. 2

extremely rigid and holds pins remarkably well.

4. *Chip Board.* This is probably the best material for most people. It is manufactured from resin bonded wood-chips, about ½ in. thick with very little tendency to warp. This material will take and hold pins easily.

You will have to acquire various tools to work with and, unless you are lucky enough to be able to borrow them, will have to buy them. Good quality tools are better to work with and will certainly outlast cheaper one's, but if you are not expecting to use them for anything more than modelling the cost is not worth it. Cheap tools from a multiple store are quite adequate and in place of a work bench, an old chair will provide a sawing horse, and joints can always be chopped out on the floor.

The size and design of the baseboard obviously depends on the layout plan, but if a portable baseboard is required, the overall dimensions should not exceed four or five feet long by two feet wide. It is however possible to increase these sizes if the baseboard is to be moved occasionally. In any case, unless the layout is to be readily accessible from both sides it is inadvisable to make it any wider than 2 ft. 6 in. because of the awkwardness in handling rolling stock.

On the assumption that you have designed your baseboard and know its size, the first step is to get the timber cut into correct lengths for assembly. A lot of people are frightened by the joints required, and for those who really cannot manage the simple carpentry involved, I would suggest that they borrow or buy a simple mitre box. This is only a channel section of wood with sawcuts at 45 degrees, 90 degrees, and 135 degrees. If the 90 degree one is used, it will ensure that your cuts—either at joints or ends—are really true and at right-angles, and will also make sawing a much easier proposition. For a number of identically sized lengths of wood, the mitre box can be used as a jig to cut all the lengths at the same time, thus ensuring dead accuracy and squareness. Having cut the sides and cross-members to length, the next step is to join them together, and this can be done in many ways, ranging from a simple screwed butt joint to the intricate dovetail. Fortunately there is no need for the latter, but there is no doubt that a simple half-joint is much stronger than a butt joint. The two joints shown in Fig. 1 are easy to make, but care must be taken when cutting to obtain a tight fit.

Cutting of the joints is carried out by starting with two pieces of timber cut to length for the sides, clamped together face-to-face, bringing the two 1 in. widths together. Do your marking out on these with a steel rule and a square and remember when measuring, that your timber will be planed and therefore about ⅛ in. less in thickness, i.e. ⅞ in. by 1⅞ in. First mark out the joints for your end members, then bearing in mind the type of material you are using to cover the framework, space your cross-members equally between the two ends. Check your measurements again before unclamping, then square your markings across the side and down the opposite 2 in. faces. If you are using the joint shown in Fig. 1, the depth should be half the thickness of the timber, i.e. 15/16 in.

The next step is to saw down the sides of the joints with a fine tenon saw, cutting just inside the pencil mark to allow for the width of the saw teeth. It is better to err on the side of tightness, as this can obviously be corrected. The efficiency of a loose joint is practically nil. Work the waste wood out of the slots with a sharp chisel, a small amount at a time, with a series of sharp taps with a mallet, gradually working down to the line. Clean out with the chisel only.

Repeat the above procedure with the cross-members, then lay one side member on the floor and with a mallet tap the cross-members home. Lay the other side in position and repeat the operation. If your work has been even reasonably accurate, you should be able to move the framework about without danger of collapse. Before screwing the parts together, test for squareness by measuring diagonally from one corner to the opposite, checking with the other two corners. Any deviation should be corrected by gentle tapping until true squareness is obtained.

The art of getting screws easily but firmly into wood, lies in correct drilling. A hole the length and diameter of the plain part of the screw shank is drilled first, followed by a finer one to pilot the screw in, and finally a countersink is used to enable the head to drop down to the surface level of the timber. Dip the ends of the screws in grease to prevent rusting, and to help you to withdraw easily should the occasion arise. Drive the screws firmly home and lay the completed framework upon the sheet of covering material and mark round with a pencil. Cut just outside the mark and plane the surplus flush after fixing with screws. Your baseboard top is now complete.

Use 2 in. by 2 in. timber for legs, with 2 in. by 1 in. cross and diagonal bracing rails. In order to allow for the bracing stays, the overall width of the legs should be 1¾ in. less than the inside width of the top, as this allows the diagonal stays to be secured to the outside of the legs and the inside of the baseboard framework top. Unless neatness is important, it is not necessary to cut joints in the legs for the cross-bracing. Sufficient rigidity will result by screwing the braces direct to the legs, making quite certain that the assembly is square.

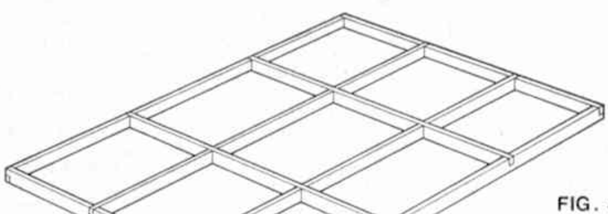
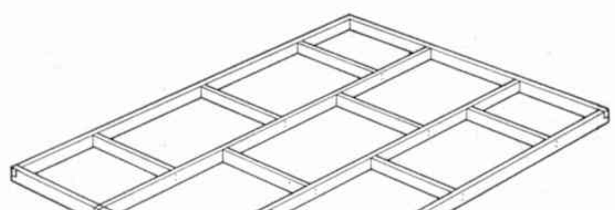


FIG. 3

6' X 4' BASEBOARD FRAME

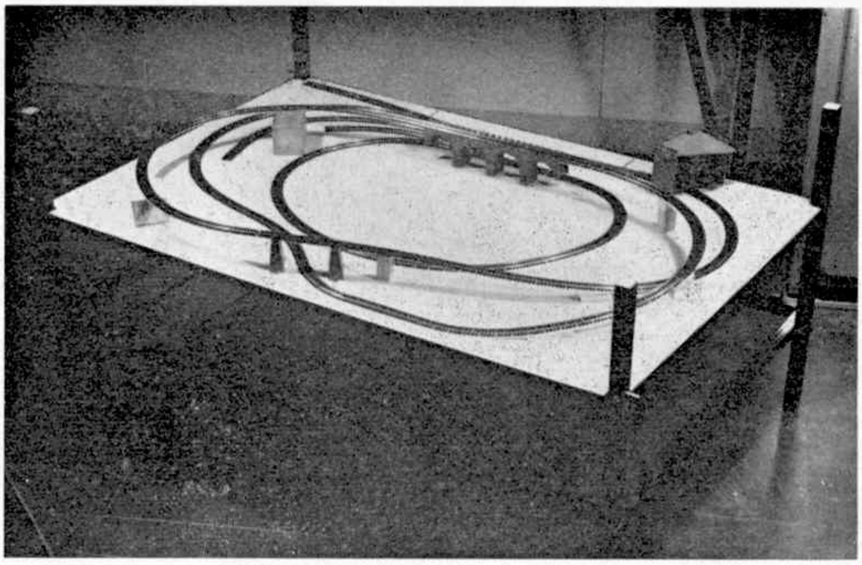


ALTERNATIVE FRAME TO AVOID HALVED JOINTS

Continued on page 411

BUILDING AN "N" GAUGE LAYOUT

PART III

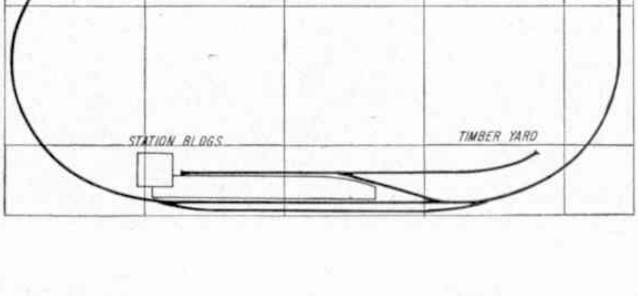


TRACK FORMATIONS

by P. Tomlinson

LAYOUTS THAT grow from train sets usually include a single oval of track with perhaps one or two points to a siding or loop. As good a way as any for you to begin, but trains can only go round chasing their own tails, and this very soon loses its appeal. You will find that it pays to sit down with paper and pencil and doodle various track plans, and what I intend to do this month is to present various track formations that you could build, together with suggestions for the operation of trains.

It is unfortunately impossible to model any ordinary station from actual life, absolutely to scale, because of the space that would be needed. An ordinary country station, for example, modelled in " N " Gauge, would probably require a length of over ten feet in itself !



Naturally, when larger stations are tackled, the area increases proportionately.

When you first try your hand at layout design, you are likely to fall into certain errors that can quite easily be avoided. In the first place, you will probably imagine you are planning for all time, and that your layout should be so perfect as to need no subsequent alteration. There is no such ideal layout, and indeed the satisfaction of re-designing your layout can occasionally be far more stimulating and rewarding than the original work. The best layouts are always those that have been improved and extended. After all, we only discover our errors by making them !

Even a small " N " Gauge layout on a 3 ft. by 4 ft. baseboard however can be equipped with a prototype track formation, and although the facilities will obviously be limited, they can nevertheless provide the basis for shunting and running movements.

A temptation that must be avoided is that of over-complicated trackwork, which may look very imposing, but which will need endless care. Another danger is that of over-crowding the layout to such an extent that it assumes the appearance of a dog's dinner ! It is also a good idea to conceal some of your track in tunnels.

However simple or complicated a layout, imagination must be used in order to run the trains. In full size practice, of course, the railway conveys the traffic that is offered. On a model railway however, there are no passengers to book, and no traffic to consign. We are the passengers, the consigners, the consignees, the railway commercial department, the stationmasters,

Our heading photograph shows an " N " gauge layout in its early stages of construction.

Fig. 1: One of the simpler layouts incorporating two stations, one main line and a few sidings.

Fig. 2: A slightly more complicated layout with two main lines. A non-stop express could be run here.

Fig. 3: A more complex layout with available track for an express and branch line. The dotted lines are extensions that can be added latter, or used as alternatives.

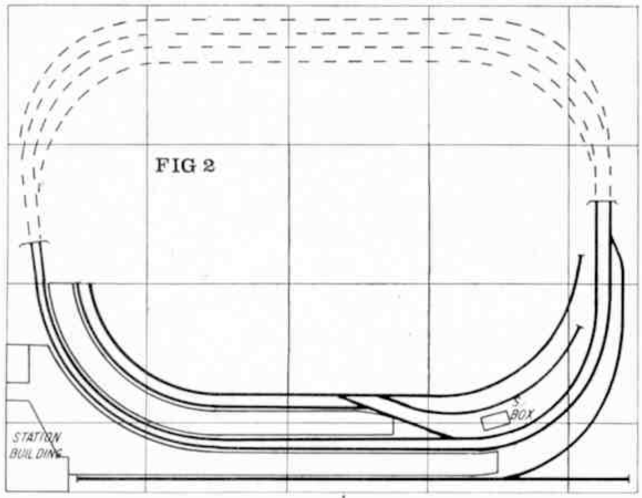
driver, signalman, shunter and porter, all rolled into one. For a model railway to be worked like a full size one, it must have a reason for its existence, which is where our imagination must be used. We have created a railway and we must create its theoretical background.

A branch line layout must have a junction with a main line so that through traffic can be worked and connections made. The junction end of the layout need not be modelled—hidden sidings inside a tunnel under a hill are perfectly adequate. A branch is most likely to serve a rural district or agricultural community—perhaps a small market town at its terminus with one or two villages between this and the junction with the main line. This is the most popular type of layout and can be worked by old engines and coaches, or diesel multiple-units. Let us assume, for the purposes of this description, that the layout is modelled on the lines set out in Fig. 1. The railway appears from the hidden sidings in the tunnel, passes through a village station and proceeds to its terminus at the market town. The village station has a siding connection which serves a nearby timber yard or milk depot, and the market town has a single platform road and a small goods yard. A large manufacturing town, represented by the hidden sidings, exists at the junction with the main line about ten miles away.

Passenger trains will therefore be needed for people working in the large town. In fact there should be enough passengers to justify running a three or four coach train to the junction in the morning and back in the afternoons. Also a two-coach train each way at mid-day would cater for people from the outlying villages. Freight traffic also has a definite pattern. Coal, foods, machinery, manufactured goods and certain perishable traffic will arrive at the market town, while outgoing traffic will consist of farm produce, livestock and timber. Extra trains will be necessary on market days, with parcels vans and horse boxes attached to the end of some of the passenger trains.

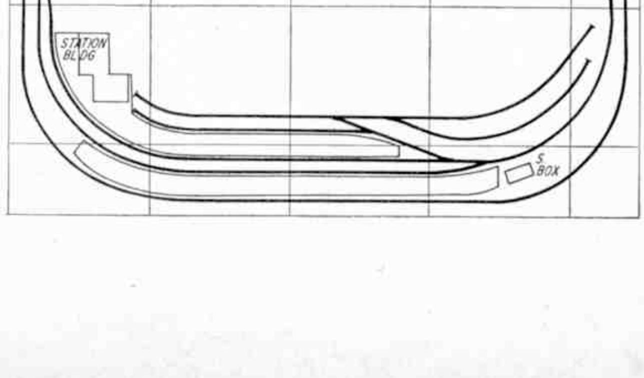
Trains themselves could consist of two-coach suburban sets, doubled at peak hours, with a spare coach available for strengthening the service on market days. One or two parcels vans and horse boxes, together with a selection of goods wagons complete the rolling stock. For locomotives, and 0-6-0T, 0-4-2T or 2-6-2T would be suitable for handling all the local traffic, while an 0-6-0 tender goods locomotive and a 2-6-0 might be useful for through traffic to the main line. On modern layouts two-car diesel multiple units and a type 1 Bo-Bo diesel would be ideal.

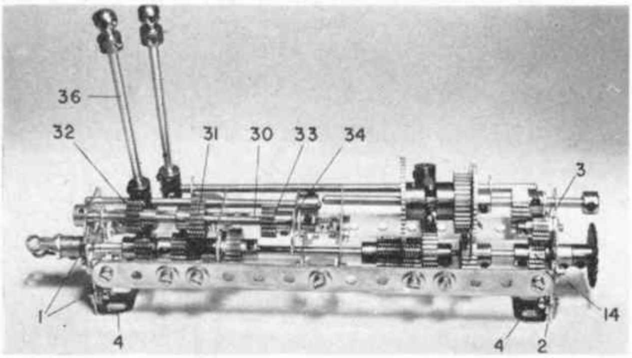
If you prefer running main line traffic with non-stop expresses tearing round the layout at high speed, then a main line through station would be the principal feature of the layout. It can be situated on a continuous double track main line so that trains can be run for lengthy periods, but the layout will also lend itself to prototype operation with sequence or timetable operation. Such a scheme is illustrated in Fig. 2. The station could serve an industrial town, while other towns and cities along the route are represented by storage sidings. Several express trains would operate during the day, with probably an extra two or three trains in the morning and late afternoon, forming a "rush hour." To add interest some trains could terminate at the station itself so that shunting and other movements become necessary before the train can make the return journey.



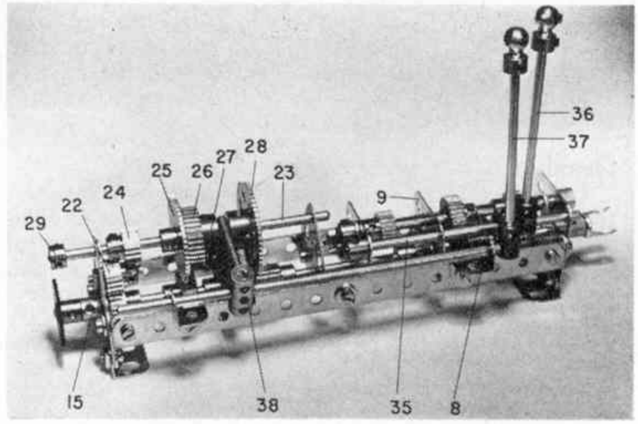
However, the operation of such a main line layout can be made far more interesting and varied by converting the through station to a branch junction and adding a complete branch line. There is endless scope for the operation of express trains on the main line through such a station. Some could call to make connection with the branch passenger trains or even to pick up through coaches from the branch. Parcels trains could be run, and freight traffic would be as varied as your rolling stock would permit. General freight trains conveying mixed loads can stop at the junction yard to exchange wagons and traffic for the branch. Motive power can also be as varied as you like. A simplified version of this type of layout is shown in Fig. 3, and this will form the basis for the "N" Gauge layout that I will begin building and describing next month.

In the meantime, those of you interested in this project might care to obtain some squared paper and draw out a scale plan of the baseboard surface, and also sketch out numerous layout designs to fit the available area. Many books and articles on scale layout plans have been published, and from these you may find a design that suits your needs best. You can however copy the design in Fig. 3 and follow my instruction if you so wish. Finally, draw out the ultimate design to as large a scale as possible and make quite certain that nothing is over-crowded or cramped in too-small an area.





The international appeal of Meccano is characterised by this comprehensive Gearbox. It was designed by Hungarian enthusiast Andreas Konkoly of Budapest and incorporates six forward and three reverse speeds.



Another view of the remarkable gearbox. Looking at its comparative simplicity it becomes rather hard to believe that there are no less than nine operating speeds enclosed in its narrow frame!

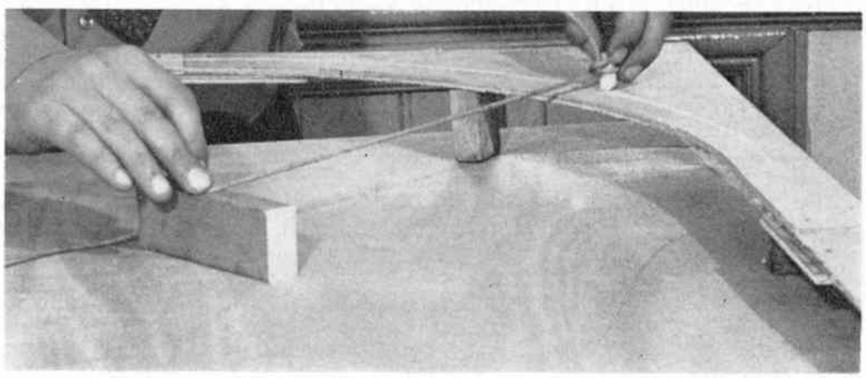
change lever, is held. A Handrail Coupling is mounted on the upper end of the Rod to improve realism, a similar part being mounted on the other gear-change lever 37, this also supplied by a 3 in. Rod held in a Short Coupling. This Coupling is fixed on a 6½ in. Rod sliding in the Corner Angle Brackets bolted to the framework. A Coupling 38, carrying two 1½ in. Rods in its end transverse bores, is secured on the Rod, the smaller Rods locating in the waist of Socket Coupling 27, then, finally, a 1 in. Sprocket Wheel is mounted on the end of the input shaft to receive the drive, while a Small Fork Piece is mounted on the end of the output shaft to take the drive elsewhere.

In a sense, Mr. Konkoly's gearbox is two units in one, the first stage giving one reverse and two forward speeds and the second stage giving three speeds for each gear engaged in the first stage. This of course results in an overall range of three reverse speeds and three forward speeds for each of the two first-stage gears, making six forward speeds in all.

PARTS REQUIRED

2—1b	3—15b	1—27a	2—63d
1—6a	3—16b	2—31	1—96
2—9f	1—17	27—37a	4—103h
2—11	2—18a	27—37b	1—116a
4—12	4—25	18—38	2—126a
2—12a	7—26	1—48	2—136a
1—14	1—26b	5—59	1—154a
1—15a	1—27	1—63	1—154b
			1—171

BUILDING AN 'N' GAUGE LAYOUT PART IV



GRADIENTS AND BASEBOARD PLAN

SHOULD YOU design a layout that includes a high level section of track, you will naturally find that an incline and a raised baseboard will be required. Construction of high level baseboards is, in fact, similar to that of the baseboard proper, with the top surface cut exactly to size and strengthened by one inch square timber cross-members screwed to the underside about nine inches apart. The distance between the baseboard and the top of the high level section should be about three inches. If it is any less, you will find it awkward to retrieve derailed rolling stock from underneath. If on the other hand, it is any higher, the gradients on a small layout will be too steep.

Offcuts of 2 inch by 1 inch timber, cut to length, are used to support the raised baseboard, and these should be positioned so that they do not interfere with any trackwork underneath. These supports are screwed down to the main baseboard surface from underneath, and then the high level section is laid in position on top, and in turn screwed to the supports. This however must be made easily removeable for access to tracks beneath—assuming that there are tracks underneath—although it is better to keep it fixed down until the incline has been built.

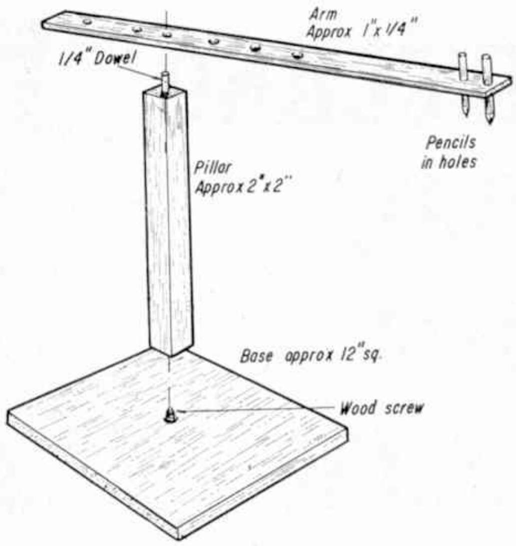
In my opinion, it is better to make the incline as long as possible, and certainly not any steeper than a gradient of 1 in 25, which even so, will be over six feet long to climb three inches. Even this gradient will severely limit the length of trains you can run up to it.

The incline track bed should be made from fairly rigid material such as ⅜ inch or ½ inch thick plywood, cut into strips about 2 inches wide for single track and 3 inches for double track. These strips should be as long as possible to reduce the number of joins needed. The various incline sections should be butt-jointed with a similar piece of plywood about 6 inches long, giued and screwed firmly underneath so that the joint does not twist or stretch while the incline is being fixed in position. The bottom edge must be chamfered or planed down so that it lies flush with the main baseboard without a step.

The supports for the incline are made from 2 inch by 1 inch offcuts, with the top one fixed in position to the baseboard first. The incline is laid in place with the top end against the high level board, and then nailed lightly to the first support. A long piece of timber, as straight as possible, is now laid on top of the incline trackbed, and the remaining supports positioned underneath so that the length of timber lies perfectly flat on the trackbed. The supports can then be glued and screwed down.

Having finished the baseboard construction the next step—one of the most important—is to transfer the track plan from paper to the board itself. Equip yourself with a steel rule marked in inches and millimetres, a length of wood with at least one straight edge, pencils, a rubber, and of course your layout drawing.

When transferring the track plan on to the baseboard, you may find difficulty doing accurate drawings of the pointwork and curves. To solve this problem, I used a simple home-made gadget called a " trammel ", shown in Fig. 1. The sketch should be self explanatory, showing how the parts fit together. The sizes shown are only approximate, as odd pieces of timber can be used, but the length of the pillar depends on the height of the baseboard from the floor. I have used two pencils 27 mm. apart at the end of the arm to draw the centre lines of parallel tracks, and I simply removed the outer pencil for single track. The arm is drilled with $\frac{5}{16}$ inch



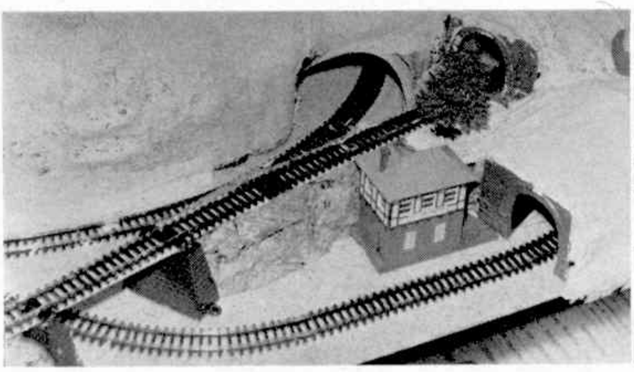
holes at 3 inch spacings, so that curves of different radii may be drawn, the smallest being nine inches, and the longest two feet, measured from the inner pencil.

To mark off the position of the track on the baseboard, just place one of the holes in the trammel arm over the ¼ inch dowel in the top of the pillar and mark off a suitable radius on the baseboard. I always find it easier to draw the curved tracks on the board first and then join them up using the straight edge to draw along. If you are unable to use the trammel with the pillar standing on the floor, place the arm on the baseboard and use a short length of ¼ inch dowel as the pivot, placed through the appropriate hole and held firmly down on the baseboard top.

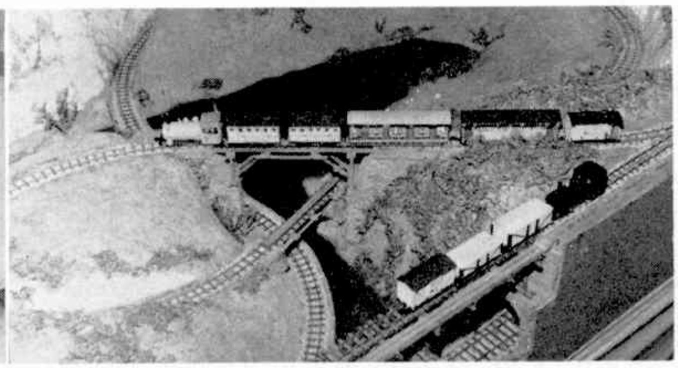
Some people prefer to use a cardboard template to draw the position of the points, although it is just as easy to use the actual point itself. This is laid in position over the pencil line previously drawn—preferably the straight one—and using a sharp pencil, the centre of the diverging track is marked on the baseboard between the sleepers of tbe point. The point is then removed and the pencil marks joined up with a single line.

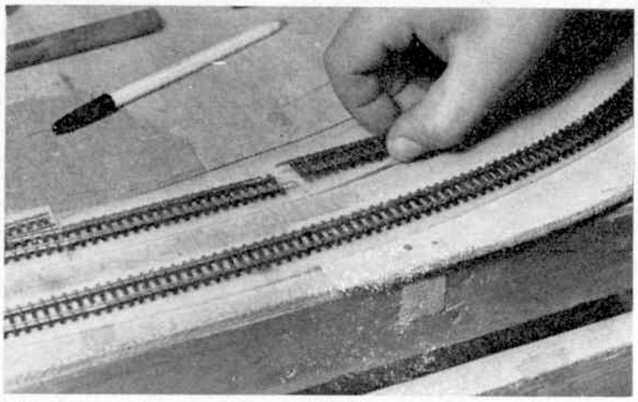
All the trackwork on the baseboard should be drawn in position with no sharp bends or kinks. If a mistake has been made the pencil line can easily be rubbed out and re-drawn. When you are completely satisfied with the result, the pencil line can be inked over with a black fibre tipped pen.

Tracks at different levels on the *Model Railway News* " Coffee Table " N gauge layout.



A very complex narrow gauge layout in 4 mm scale, with gradients and different levels galore!





Filing down sharp corners and inside edges on the rails makes *fish plating* much easier.

BUILDING AN 'N' GAUGE LAYOUT

by

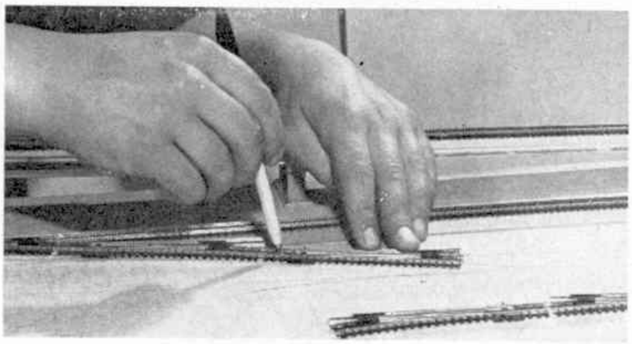
P. Tomlinson

Part V: TRACK LAYING

THE KEY to good trackwork—apart from the gauge which is taken care of by the manufacturers—lies in getting it dead flat. Twists and bumps derail rolling stock and another virtually essential aid to good running, particularly in as small a scale as " N," is to file off the sharp corners at the sides and tops of the rail ends with a fine file. Particular attention should be given to the inside edges where the flanges of the wheel bear against the rail This also makes *fish plating* much easier.

Most people use a foam plastic underlay or inlay for ballasting their track. This has the distinct advantage in disguising the necessarily overscale thickness of " N " gauge sleepers as well as producing a sprung track for good electrical contact and quiet running. Peco recommend that their inlay be fitted to the track before it is curved and laid in place. The ballast strip can then be glued down to the baseboard and the track will automatically be held in place by the ballast. Unfortunately, the glue method means that the ballast cannot be used again if a change of track plan is required. I prefer to pin the track down, but three points have to be watched. First, drill the sleepers a good clearance size for the pins you are using. It is unnecessary to drill the holes closely together, and in fact the fewer pins you use the better, providing that the track is held firmly in place. Secondly, leave the heads of the pins " proud " of the sleepers so that the ballast strips are not compressed at all. If they are too tight the track will end up in a series of humps rather like a switch-back, which is useless for good running. Frequent use of a straight edge on the rail surface will soon show up any irregularities. Get rid of them all, even if a couple of test wagons seem to negotiate the section successfully. Finally, there must be no kinks in the track. Check this by looking directly along the top of the rails, or if you cannot get your head down low enough, use a small mirror. Although you may have used proper templates and straight edges to align the rails, it is still possible to produce dog-leg joints, especially on curves. These joints are bound to produce bad running but can be eliminated by pinning through the second and fourth sleepers from the end of each section of track, at the same time holding the joint in alignment.

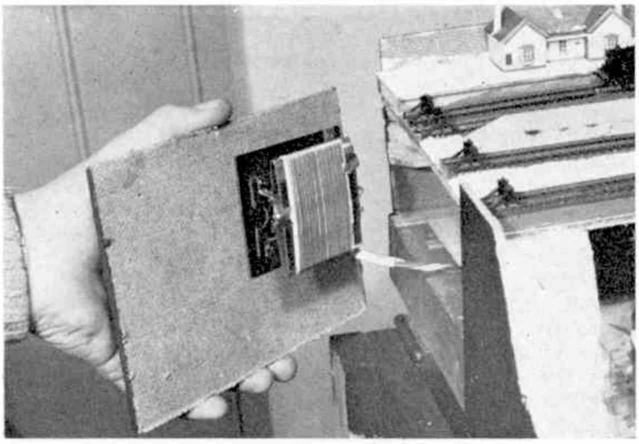
Using track as a template gives a clearer idea of where proposed railwork will be finally routed.



The easiest way to start laying your track is to begin at a terminus or hidden sidings, working your way gradually round the baseboard. Fix the point at the throat of the terminus in position first, and then lay the track and subsequent points towards the buffer stops. Remove the moulded chairs or rail fastenings on the end sleeper of a length of track to allow the rail joiners or fishplates to slide over the sleeper. Push the other ends of the rail joiners over the point rails and pin down the track, making sure that the point is aligned correctly. Fix down the rest of the track length, and continue laying the remainder of the trackwork, following as closely as possible the layout plan drawn out on your baseboard. Where two or more points are situated close together, as in a station, the sensible routine is to locate the points first and then bend and cut the track to fit. Use a fine-toothed saw for cutting the rails, and file the cut edges smooth.

Curving flexible track calls for more than just a quick bend of the track. While large radius curves can be judged by eye, anything lower than 12 in. radius in " N " gauge is best laid with a template cut from stiff card or hardboard, measuring 2 ft. to 3 ft. long. Mark this out with care, and when laying a curve longer than the template, only move it forwards for half its length, keeping the rest up against the part previously laid, and taking particular care to avoid bad alignment at points.

The appearance of the finished trackwork can be greatly improved by painting. A realistic track colour is available from the recognised model paint manufacturers and this should be used as a basic colour greatly thinned down with white spirit. Do not forget to paint both sides of the rail, wiping the top surfaces clean before the paint has time to dry. This painting can be carried out with a coarse brush using a dabbing motion. After this basic colour has dried, further applications of different colours can be used to create greater realism. The main line ballast will probably look newer and fresher than that in goods and locomotive yards. There will be patches of dirtier, darker colour on the ballast where locomotives have stood in station areas, and by coal stages the track bed will consist mainly of coal dust, so you will have to use your powers of observation and imagination to reproduce this sort of effect in miniature.


A small controller of this kind can often be mounted into the baseboard structure itself, instead of on the lineside.

BUILDING AN 'N' GAUGE LAYOUT

by P. Tomlinson

PART VI ELECTRIFICATION

WITHOUT ANY doubt, the most important aspect of electrification is the electric motor which drives the locomotive. To make the motor go, and to provide speed and directional control of our trains, we must have an electricity supply.

In order to do useful work, an electric circuit must have a flow-and-return, that is to say, the current-carrying conductors must make a path from the power unit, through the apparatus to be operated and back again to the source. That is why it is called a "circuit"—a complete break anywhere in the circuit causes interruption of the current and the work done instantly ceases. Our electric motor then, has to have connected to it a "feed" and a "return" wire, and when connected to the proper supply, it runs at full speed (Fig. 1). In order to prevent it from running when we do not wish, we install apparatus like for example a switch (Fig. 2). Another essential requirement is that we control the speed. This is usually done—though not always—with a variable resistor which has the affect of reducing or restraining the voltage in the circuit (Fig. 3). Turning the control knob of the resistor varies the amount of the voltage flowing in the circuit and with it the speed of the motor.

The third factor which we need to control is the direction in which our engine runs. This is carried out by merely reversing the direction of the supply—in other words crossing the feed and return wires over. To do this, we use either a special switch, in conjunction with a variable resistor (Fig. 3) or a commercial reversing controller which gives speed and reversing controls in one unit (Fig. 4).

Although it would be possible to design a layout and locomotives to operate straight from the mains, this would be difficult and extremely dangerous. So our models run off a supply at a much lower voltage, generally 12 volts. This can be provided by either dry batteries, for small, simple layouts, or a car battery rated at 12 volts. Both are expensive ways of providing power, especially batteries, because of their short life. A 12 volt car battery is expensive to buy and has the inconvenience of having to be recharged at intervals. By far the best way is a transformer and rectifier working from a.c. mains. Many good units are available, all specially designed for model railways and I shall assume that one of these will be used.

It is possible to use almost any type of wire to connect up the power unit to the track, but the ideal is plastic covered flex. Colour is not important, unless you wish to distinguish between the "Feed" and "Return" wires and the 15 volt a.c. supply to point motors.

You can run the wires directly from the control panel to the track, but I find it better to take it through at least two tag strips or chocolate block terminal strips of the type made by Tri-ang screwed to the baseboard framing—one for the feed wires, and the other for the return. This will simplify the wiring and make it a lot easier to rectify an error, as well as providing an anchorage for inter-baseboard wiring.

The connections to the tag strip and the rail are best made by soldering, using an electric soldering iron of about 15 to 25 watts rating. You will also need a coil of cored solder, a pair of small pliers, a wire cutter and a wire stripper.

Most tags have a small hole in the end, and the bared end of the wire is threaded through this hole and bent back. The hot iron is placed on the tag and the end of the solder is held against the tip of the iron. As soon as the solder melts, remove the iron and allow the joint to cool. Tug the wire to see that it has made a sound joint, and the job is done. Use plenty of heat and unless the solder melts quickly and forms a bright silvery blob, remove the iron. Any other joint will be a bad one and should be re-soldered with a hotter iron. In most cases, a tug on the wire will show this, because a "dry" joint, as it is known, has little strength and the wire will come loose.

When soldering wire to the rail, take care to find a suitable position like across a rail joint—where this is not an insulating gap. Drill a small hole through the baseboard alongside the rail, between two sleepers, push the wire up and remove a quarter of an inch of insulation from the end. Scrape away all the oxide coating from the web of the rail with a small screwdriver and place the bared end of the wire into this place. Apply the heated soldering iron bit, and solder the wire to the rail. If you have to attach wire to screw terminals, like those on a power unit, never strip off more insulation than is necessary and also twist the bared end of the wire into a clockwise loop. Place the loop over the terminal and tighten up the screw, closing the loop in the process.

Development of the simple layout, with one engine, one operator, one power unit and one pair of wires to the track usually begins with additional locomotives. These have to be "parked" when not in use, on sections of track electrically isolated from the rest of the layout. If these sections are well arranged, very realistic operation becomes possible and the layout will be far more interesting.

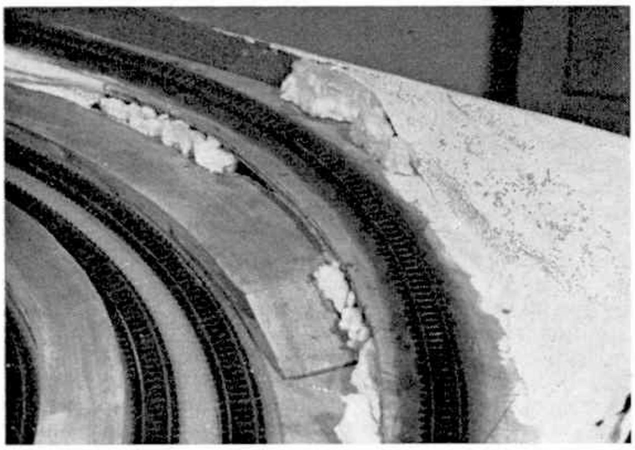
Broadly speaking, it is wise to provide a dead section in every position where a locomotive is likely to remain standing while another is being moved. An obvious place is at the buffer stop end of a station platform, so that when a train has arrived another engine can be backed on to draw off the coaches. It is also useful to be able to hold a train on the running line itself, just clear of the station, while stock in a platform line is being shunted to allow it to enter.

In practice, dead sections are usually left on or "live", and are switched out only to "kill" a locomotive so that no matter how many are included, it does not make a layout any more difficult to operate. Fortunately, the majority of commercial "N" gauge points are isolating points and have an isolating switch incorporated in their design, allowing the electric current to flow only in the direction the point is set for. This eliminates the need for a separate switch on the control panel for each siding and switches only need be provided for main line sections and dead ends.

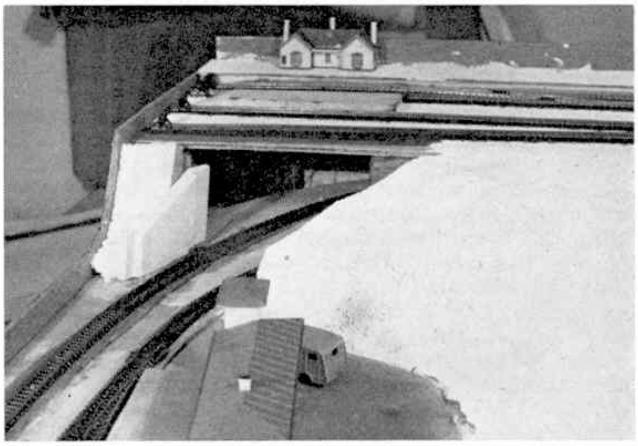
Small on/off toggle switches are all that are required, and these should be mounted on a suitable wooden board, preferably alongside the control unit. This board can be fixed to a light frame for screwing or bolting in a convenient position on the side of the baseboard. If a tag strip is also mounted on this control panel, the feed wire from the controller should be soldered down one side, with other wires from the other side going directly to their appropriate switch. It simplifies matters if the switches and their tags are numbered. From the other terminal of the switch, the wire is taken to a further tag strip under the baseboard, and then to its appropriate track section. The return wire from the section goes direct to the return on the controller, via another tag strip. Fig. 5 shows a simple wiring circuit.

Two further points should be noted. The first is that isolating gaps, joined by nylon fiishplates, MUST be provided in each rail between sections, and secondly, the feed and return wires must be soldered to their respective rails, otherwise the locomotive will operate in opposite directions on adjacent sections!

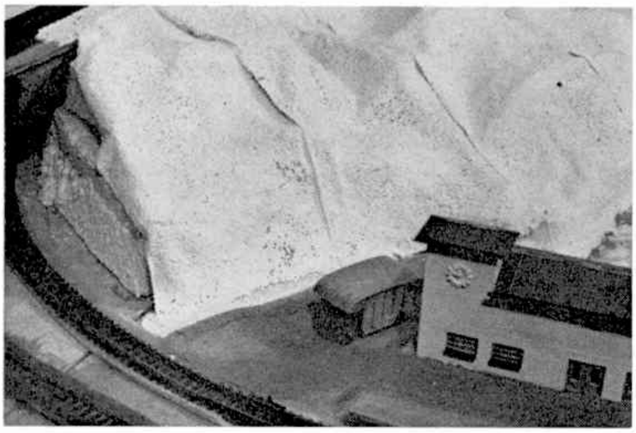
SCENERY WITH "MOD-ROC" . . . . More next month



The Mod-Roc scenic material needs support, which can be provided simply with screwed-up newspaper, seen behind the platform in this picture.



Having immersed the Mod-Roc cloth in water for three or four seconds, and gently squeezed it out, it can be applied and gently pressed to shape, giving a result as above.



Mod-Roc "hillside" before painting. The texture of the material can be seen clearly in the photograph. Note the supporting softboard "Former" on the left.

Tunnel approach cutting after painting. Bare patches of Mod-Roc simulate a chalky terrain, and "trees" relieve any tendency to bareness.