RAILWAYS IN THE GARDEN

By Mike Wade

This photo shows the attraction of live steam railway modelling in the garden - Phil Rowe's gauge "1" Midland class 4P in action.

The larger scales of model railways offer a lot of scope for the model engineer ...

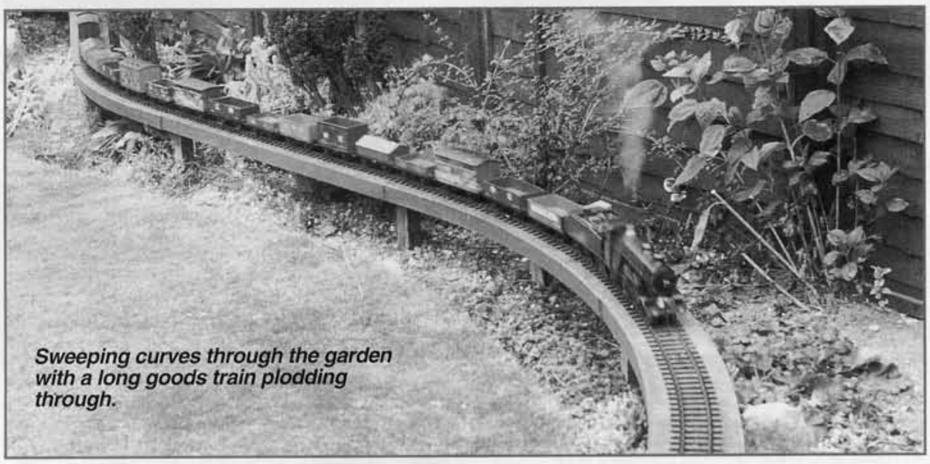
When one thinks of the term "Model Railways" it is usually the smaller scale electric layouts of "00" and "N" gauge which come to mind. Or, maybe, the "large" fine-scale layouts in "0" gauge are dreamt of. What many people don't seem to realise yet is that there is a range of scales which lie between the popular "model railways" and the "model engineering" sizes which are used for passenger carrying at local fetes and club tracks.

If we take a look back at the model railway scene around the late 1920's and the 1930's it will be seen that these larger scales were the more popular ones in those days. Firms like Bassett Lowke and the Leeds Model Company were producing locomotives and rolling stock to run on track gauges of 1.1/4" ("0" gauge) and 1.3/4" (Gauge "1"). There was also 2" gauge (Gauge "2") and 2.1/2" gauge (Gauge "3") and some people were even running 3.1/2" gauge model railways in their gardens. It must be realised that homes were often quite large in those days and that gardens were also much bigger than we are used to in current times.

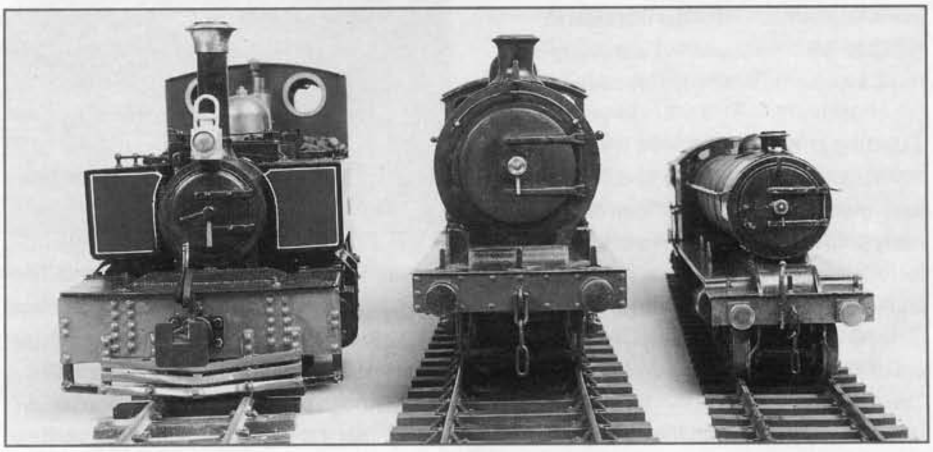
The restrictions and destruction of homes brought about by the war years inevitably led to a shortage of space and materials. This, in turn, led to the building of smaller homes with smaller gardens and also meant that there was less money available to spend on hobbies and pastimes. As a result of all this, smaller model railways became popular and "00" gauge (16mm gauge) was small enough to fit into a room within the house. Eventually, after a few different sizes were tried out, the even smaller "N" gauge (9mm Gauge) gained rapidly in the popularity stakes.

This is all very well for those who are happy to build and run electrically driven models of steam locomotives etc., and the model engineer who wants to operate real "live steam" models has been able to do so all the way through from the pre-war years thanks to the writings of "LBSC" and Martin Evans etc. in the model engineering press. Inevitably this has meant using the larger scales and running on gauges of 3.1/2", 5" and 7.1/4" etc. There are two main reasons for using the larger scales - one is that it is thought to be easier to build "larger" working steam models and the other is fact that " larger" models are more powerful and, therefore, more impressive when hauling loads of full size people.

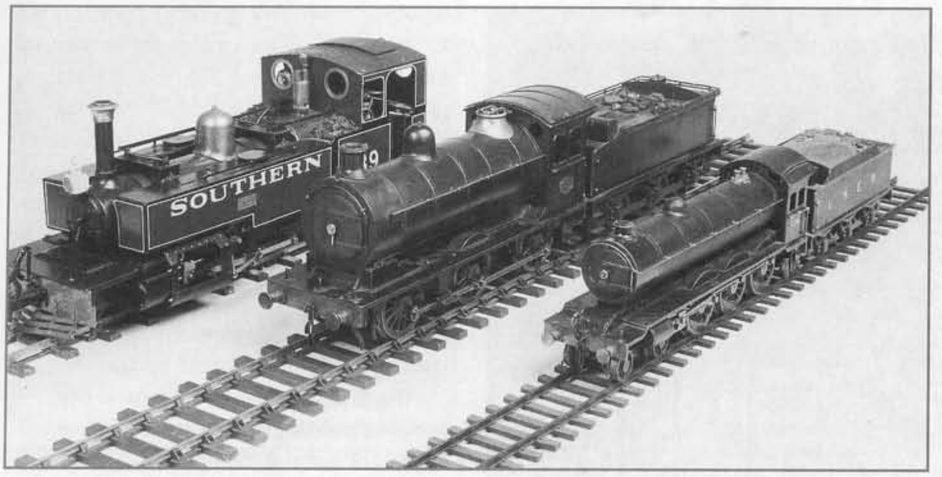
However, over the last ten years or so the world has undergone more drastic changes



Sweeping curves through the garden with a long goods train plodding through.



Comparison of scales and gauges: Left - 16mm scale narrow gauge on '0' gauge track. Centre - 10mm scale gauge '1' loco on gauge '1' track. Right - 7mm scale '0' gauge loco on '0' gauge track.



Scale comparison as previuos photo but giving a clearer indication of relevant sizes.

This photo shows that the smaller narrow gauge locos do not look too much out of scale when running with standard gauge '1' stock.

This girder bridge and tunnel in gauge '1' blend in very neatly with the garden features.

and the effects of the world recession have left most of us with less money to spend and more free time on our hands. Redundancies and short time working are becoming common place these days, unfortunately. The only thing which doesn't appear to be affected by all this is the modeller's desire to want to make something. That, coupled with increasing awareness of the fact that our Heritage is fast disappearing is creating even more interest in "live steam" modelling.

Turn to the Garden

So, what can we choose to do? The small scale model railways of "00" and "N" are not really practical for live steam and the 5" and 7.1/4" gauges are becoming too expensive and need quite large areas for running them. Is there anything which lies between these scales? The resounding answer has to be "Yes"!

Let us delve back into the history books and look at the "Garden Railways" again. Why were they so popular before the War years? Because they were large enough to be able to use "live steam" locomotives yet small enough to fit into an urban back garden. But "gardens are now much smaller" I hear you say! Yes, I must agree with that. But I will then ask what kind of railway would you like to run. Do you need a full double track main line with junction stations etc. or would a simple single line circuit around your garden (perhaps with a passing loop and a siding) be sufficient to keep your interest? Is your main interest in "running a railway" or is it in "driving a live steam locomotive"?

Don't get me wrong. I am not decrying either approach. I am just trying to get you to ask yourself these questions - your own answers will help you to decide what to do. If you need a big main line layout, is your garden big enough to accommodate it in Gauge "1" for instance? On the other hand, if your main desire is to build your own live steam locomotive and then run it, a less ambitious layout plan might be enough for you. After all, bigger layouts need more maintenance, so there will be less time for running your locomotive!

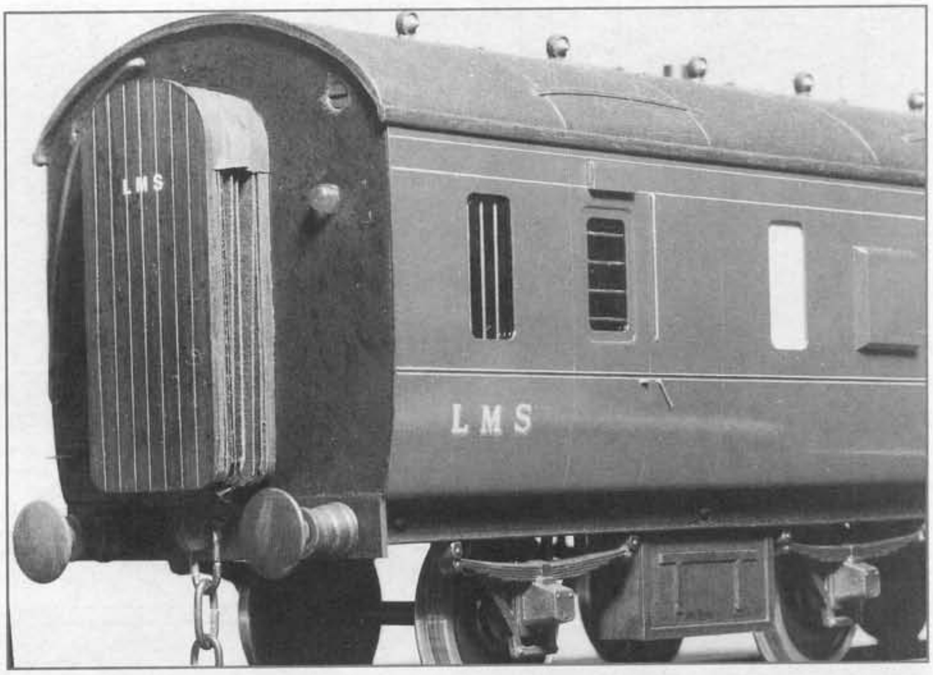
Just to set the record straight, my own ideal would be a double track main line with junction station, passing station, branch line and goods yard. Unfortunately I don't have enough space in my garden for that, but being a member of the Gauge "1" Model Railway Association gives me the opportunity to run on several different tracks like my "ideal" at other members' homes. In the meantime I am content to potter up and down a test track at home and wait for the better weather to come in the summer! As well as getting the enjoyment of working on my own engine at home in the workshop.

So much for the history and theory lessons! Let's take a look at the practicalities.

Scales and Gauges

The sizes of model railway which we will be looking at are those of "0" gauge, Gauge "1", Gauge "2" and Gauge "3". These are the practical sizes for model railways employing live steam as the main source of motive

The late John Green is seen here tending his gauge '1' LMS Patriot and passenger train on a garden layout.



A close-up shot of the end of an LMS coach in gauge '1' showing some of the detail which can be built into this scale. The red bulge in the end is actually a working tail lamp!

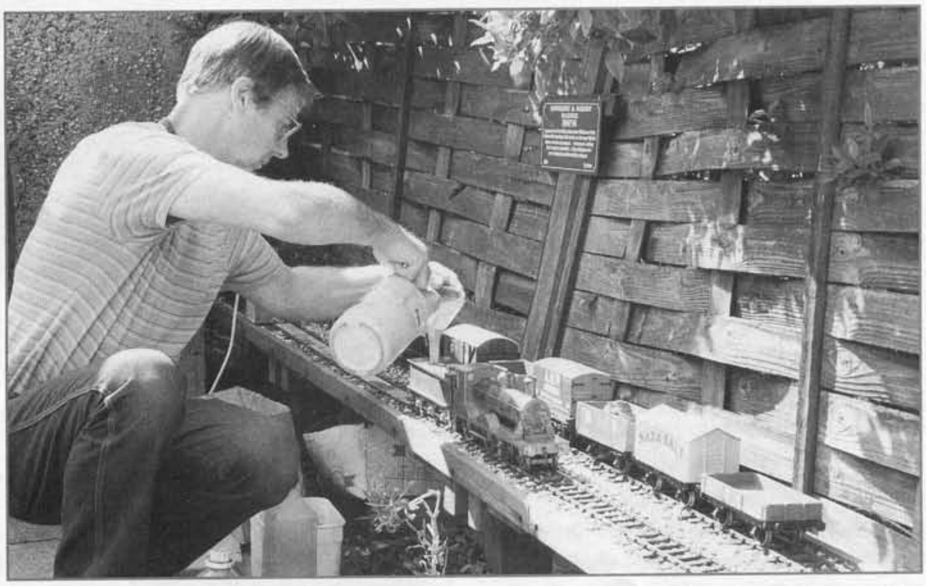
power. It should be noted that other forms of propulsion such as diesel, gas turbine, clockwork and electricity are also quite practical in these scales. We will also be looking at a more recent development , that of 16mm Narrow Gauge modelling.

Looking first at "0" Gauge, this employs a scale of 7mm to the foot and the standard rail gauge is 32mm (1.1/4"). Two standards of modelling may be used in this scale - "Fine-scale" standards use very accurate scale sizes for wheel and track dimensions (as well as the rest of the model) and this makes it more suitable for electric operation. "Coarse scale" standards employ coarser wheel and track dimensions but this can be more suited to the running of live steam models with their inherent need for better guidance from the track due to the oscillating motion set up by power strokes on alternate sides of the engine.

"0" gauge, being the smaller of the possible live steam scales, obviously takes up less room and it is possible to have an indoor layout - if the wife will allow it! - bearing in mind the minimum radius required to run live steam models. In the garden, it is an ideal size to model in as it will allow quite complex layouts to be built in a restricted space.

There is a quite healthy support from the Trade in this scale, albeit mostly dedicated to electric running. The use of Trade items for rolling stock and, perhaps, some of the etched brass locomotive parts incorporated into a scratchbuilt steam locomotive would make this a viable scale for the model engineer to work in.

The next size up is Gauge "1" and this utilises a scale of 10mm to the foot and runs

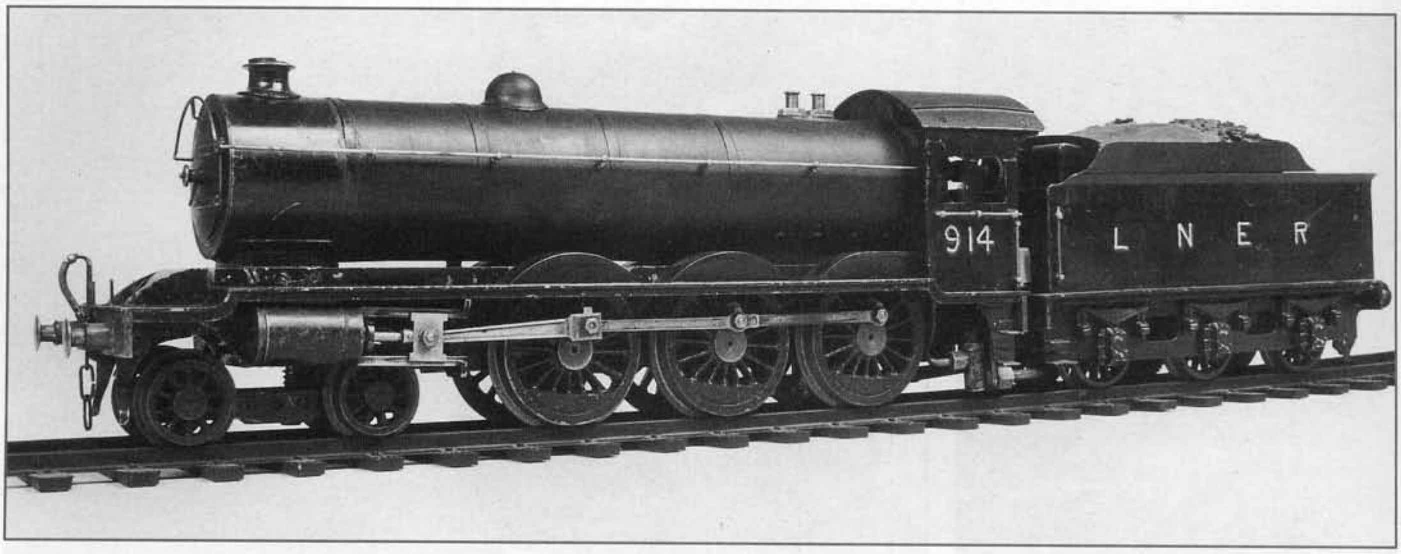


A pleasant Sunday afternoon running live steam trains in the garden with a few friends can be most enjoyable. The late Dave Cole is seen filling the tender of his gauge '1' loco in the steaming sidings prior to going out onto the main line.

on a track gauge of 45mm (1.3/4"). Some confusion can arise with the scales used in Gauge "1" because it originated in the U.K. at 3/8" to the foot but the Continental manufacturers adopted 10mm to the foot. Although the Association standard is now 10mm scale, a great many models still exist at 3/8" scale. Although they do not quite match up, it is still possible to run models made in the differing scales together as they both run on 45mm gauge track.

With a minimum recommended radius of 7ft.6in. for live steam running, Gauge "1" tends to be restricted to outdoor use in the garden but can look very attractive if blended in with the plants and shrubbery. In fact, I know of some layouts where the main line is, indeed, restricted to the garden but where the terminus station or stock storage areas are actually housed in the back room of the house or in the garage! That is obviously a luxury which most of us couldn't aspire to but it does show what can done.

There is a wealth of Trade support for the Gauge "1" enthusiast from some specialist suppliers. These days almost anything you need can be obtained, from raw castings and materials, through kit-built locomotives and stock, to ready-to-run live steam models. There is also a healthy second hand trade and plenty of help and advice is available for those who may need it.



A live steam, spirit fired LNER Raven 4-6-0 in '0' Gauge owned by Fleetwood Shawe.

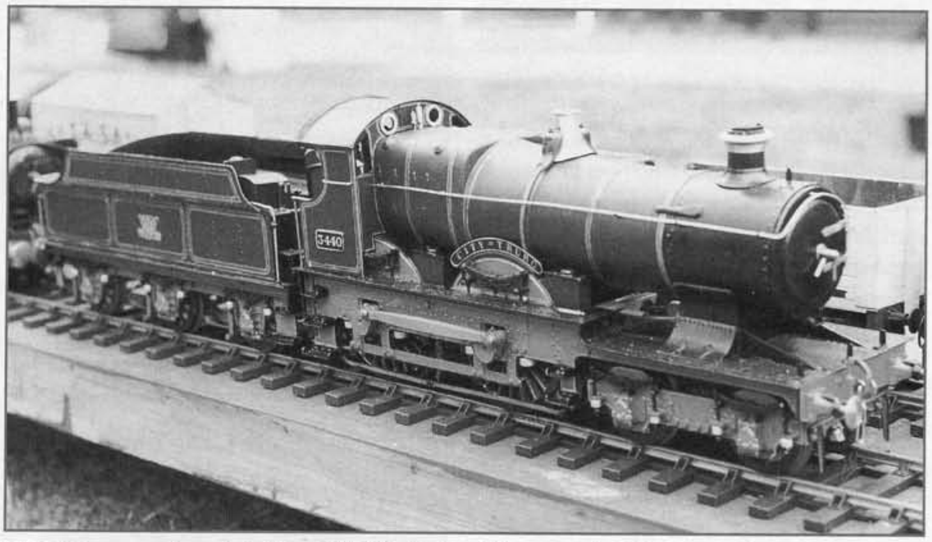
Gauge "1" is an ideal size to model live steam in as the engineering techniques and methods are the same as for the much larger models but the cost of materials and workshop facilities is somewhat lower. So, for the aspiring model engineer with limited funds and resources Gauge "1" would be an ideal choice. There is also ample opportunity to mix live steam and electric propulsion on the same tracks, using stud contact pick-up, so making the hobby all the more versatile. Younger children can be allowed to play in safety with the electric locomotives until they are old enough to run the live steamers.

Going up in scale to Gauge "2" we come to a size which is less well covered by the Trade but which is gaining a small band of supporters. Mainly started off by the acquisition of an "antique" locomotive from the prewar years, a few modellers have decided to resurrect the old scale of 7/16" to the foot, running on a track gauge of 2" and to scratch-build everything they need. This gives the opportunity to make everything oneself and to produce models which are quite impressive. A rake of Gauge "2" coaches behind a tender locomotive can be quite a sight!

Obviously the amount of space required for even a small layout in this scale is rather large but it does have a dedicated following and can be very rewarding.

Next we come to Gauge "3". This is modelled to a scale of 1/2" to the foot and uses a track gauge of 2.1/2". Although the track gauge is the same, Gauge "3" modelling is dedicated to running prototypical trains of carriages and goods stock on "scenic" railways as opposed to the 2.1/2" gauge passenger hauling employed by the model engineering fraternity. There can obviously be some interchange between the two groups, for instance there is the opportunity to run "scale trains" around the larger 2.1/2" gauge passenger hauling tracks of the model engineering societies.

At present the number of Gauge "3" followers is relatively small but there are indications that it is slowly gaining in popularity. Currently the Trade support is extremely small in terms of availability of rolling stock kits etc. but there have been several locomotive designs published over the last twenty years or so in the model engineering press and castings etc. are still available. Again, the acquisition of a pre-war Bassett Lowke engine



This fine gauge '1' model of the GWR 4-4-0 City of Truro was built by Dennis Gladstone and runs as well as it looks.

This 16mm narrow gauge locomotive is modelled on the Lynton & Barnstaple Railway's 2-6-2 "Yeo" and runs on 32mm gauge track. It has been very successfully converted to coal firing by Shawe Steam Services.

is often the starting point for the Gauge "3" enthusiast.

A much more recent development is that of 16mm Narrow Gauge modelling. Many narrow gauge railways have been built over the years to provide access in mountainous areas and to serve industrial sites such as slate mines etc. The adoption of a narrower gauge, combined with the use of smaller locomotives and rolling stock, enabled these railways to be built in restricted areas where the standard gauge railways were just too big to fit. Inevitably, some modellers realised that they could build narrow gauge model railways in their own small gardens even if there was not room for a standard gauge layout.

The more popular scale for narrow gauge modelling is that of 16mm to the foot. Due to fact that the "full size" narrow gauge railways used varying track gauges between 1ft.11in. and 3ft. the modeller must use appropriate sizes depending on the prototype which he is modelling. Some form of "standardisation" has been adopted for practicality and this gives us a choice of running on 32mm gauge (representing a nominal 2ft.) or 45mm gauge (representing a nominal 3ft.). Part of the charm of narrow gauge modelling is that all the prototype railways had their own individual character and "quaintness" and some degree of modeller's licence is accepted in terms of the scales and gauges used.

There is plenty of Trade support for this type of modelling and the availability of ready-to-run and kit-built items means that the modeller can easily get started in 16mm narrow gauge modelling. For the live steam enthusiast there is the option of purchasing ready-to-run locomotives or using ready made cylinder sets to add to one's own chassis. Of course, there is ample scope for scratchbuilding everything and some plans are available.

Most of the model railways mentioned in this article can also be run indoors. This is a scene on a small Gauge '1' exhibition layout built by the Chilterns group of the Gauge '1' Model Railway Association.

A busy seen on a large gauge '1' outdoor layout during one of the summer Get-togethers of the Association. Kevin West is seen here servicing his Midland Railway class 2P.

The Choice is Yours

As will be seen from the above summaries of the various scales, there is a choice for the newcomer (and even for the experienced modeller who wants to find something smaller, lighter or cheaper to which he can apply his skills). These "mid range" model railway scales offer a lot of model engineering opportunities, whether it be in the construction of locomotives and stock, tracklaying, civil engineering (bridges etc.) or purely "running the railway". There is even the possibility of sharing the hobby with other members of the household. I know of some wives who have developed their own interest in the railway by making lineside buildings or scale cottages etc. Keen gardeners may take an interest in the planning of the layout and blending it into the garden. Planting and tending miniature shrubs and trees can keep them happy for years!

Choice of firing methods for steam locomotives includes the relatively safe and easy use of methylated spirit burners, the use of bottled gas and, for the purist, coal firing. Probably the most popular is methylated spirits - it is more economical, easier to control and refill, and less likely to cause serious damage to the boiler if it happens to run dry. The use of bottled gas burners requires somewhat more care in that the gas tank is a pressure vessel and must be handled with care, this also applies when refilling the tank from the usual containers in order to avoid spilt gas igniting. If a boiler is inadvertently allowed to run dry, the extra heat from a gas burner could be enough to melt the silver soldered joints and cause serious problems. However, if handled with due care it is quite safe and very convenient.

Coal firing is the ultimate choice but, although it is perfectly feasible in these scales, it can be quite tricky to get the hang of it - especially in narrow firebox engines. There is no doubt that the sight and smell of a coal fired engine is something really special and I know that those who do it get enormous satisfaction and enjoyment from a good run with a good fire.

My recommendation for the beginner who wishes to become involved in this type of model engineering would be to look at the various options mentioned in this article and possibly visit other modellers in the various scales and ask for their opinions. I would think that Gauge "1" or 16mm Narrow Gauge would be a good choice because of the amount of Trade support and the popularity of these scales. Look into the clubs and associations which deal with the "engineered" model railways and see what appeals to you the most.

Above all - don't be afraid to ask - and do have a go yourself! ■

A BOILER TESTING RIG

This useful item to make will enable new boilers to be hydraulically tested for soundness before submitting to a qualified boiler inspector for certification ...

I have been asked by your worthy Editor to give details of a Boiler Test Rig I made many years ago and which is still giving good service, I must have checked well in excess of a hundred boilers with it. So here it is :- First of all, however, it should be noted here that this test rig is offered purely for the personal use of anyone constructing a copper, silver-soldered boiler in order that they may hydraulically test the initial condition of their boiler before submitting it to Authorised Boiler Testers for certification. On no account should a boiler be steamed - even for testing purposes - until it has been officially tested and certified by the appropriate qualified Boiler Testers. It should also be made clear that any boiler which may be put into steam where any member of the public may be present must be fully certificated and insured before use.

The Pump

The Pump is a simple fabrication job. The first item to start with is the *Clack Valve* and this is made from 3/8" dia. brass rod. Face one end and then centre drill before drilling and reaming 1/8" dia. x 1" deep. Open out to 7/32" dia. x 5/16" deep, tap 1/4" x 40 t.p.i. and finish the bottom square by using a "D" bit. Part off at a shade over 7/8" long, reverse in the chuck and face to a finished length of 7/8". Then drill 7/32" dia. and tap 1/4" x 40 t.p.i. to 5/16" deep and again square the bottom of the hole using the "D" bit.

Remove from the lathe chuck and mark out and cross drill a 1/8" dia. hole halfway along its length to break into the bore from one side only. Open out this hole to 3/16" dia. x 3/32" deep.

The *Cylinder* is also made from 3/8" dia. brass rod. Face one end of the rod and then centre, drill and ream 1/4" dia. - taking care to leave a nice finish - and part off just over 1.1/2" long. Reverse in the chuck and face to a finished length of 1.1/2". Carefully remove any burrs which may be formed in the bore after facing off.

The *Joining Piece* is made next from 3/8" dia. brass again. Face, centre and drill 1/8" dia. x 3/8" deep. Turn the outside to 3/16" dia. x 3/32" long and then part off at a shade over 5/16" long. Reverse in the chuck, carefully holding on the 3/16" dia., and face off to 5/16" overall length before turning the o.d. down to 1/4" dia. x 3/32" long to fit into the cylinder.

The *Pump Column* is made from 1/2" x 1/4" brass bar cut to length and milled or sawn to form the two cut-outs, leaving the centre lug. Mark out and drill the 3/8" dia. and 1/16" dia. holes and also the 8 BA fixing hole.

The *Base* is a piece of 16 swg brass plate cut to size. Mark out and drill the four no. 34 holes (no. 34 drill = 2.8mm) and also the no. 43 hole (2.4mm) - countersink this hole for an 8BA c'sk screw.

Position the cylinder in the pump column (making sure that the clack valve end will be clear of the edge of the baseplate on assembly), assemble the clack valve, joining piece and cylinder and silver solder all the joints together - including the cylinder to column joint. Allow the assembly to cool before pickling to clean off excess flux.

Using an 8BA x 1/4" long countersunk brass screw, secure the column to the base taking care to position it so as to give free access to the vertical clack valve. A 1/32" dia. hole is now required in the bottom of the clack valve, just clear of the land on the 7/32" dia. Put a piece of brass wire through this hole and soft solder it in position, this is to prevent the ball from seating on the suction stroke.

The *Inlet Union* is made from 2 BA hexagon brass bar; face, centre, drill and ream 1/8" dia. x 5/16" deep. Turn the o.d. to 1/4" dia, and thread 1/4" x 40 t.p.i. Part off to length - 1/4" overall. A 5/32" diameter steel ball is now required to form the seat in the time-honoured manner of giving it a light knock with a hammer, using a spare piece of brass in between. Now, using a new bronze or stainless steel ball in the clack valve, screw the inlet unionin position using fibre washers to give a lift on the ball of approximately 1/32". This technique is again used later on with the gauge body.

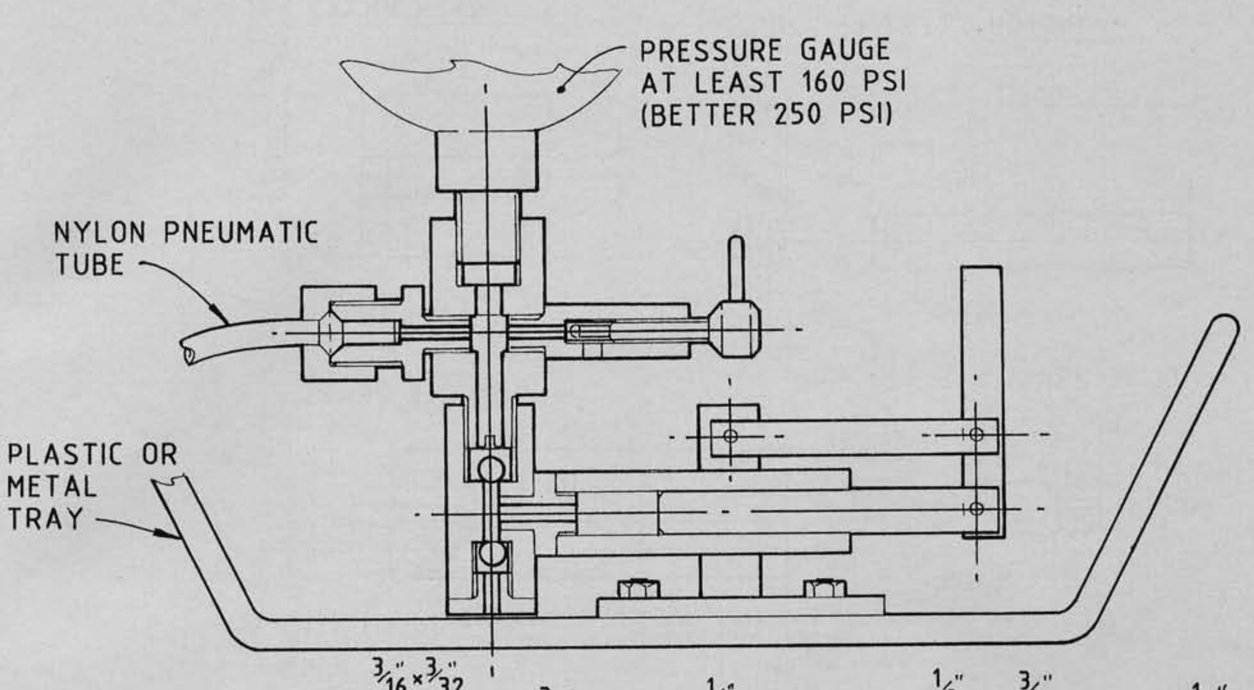
The *Pump Handle* is a piece of 3/16" x 1/8" brass strip cut to length, with two 1/16" dia. holes to the dimensions shown on the drawing. The business end of the handle should have a nice radius filed on it to protect the hands when in use.

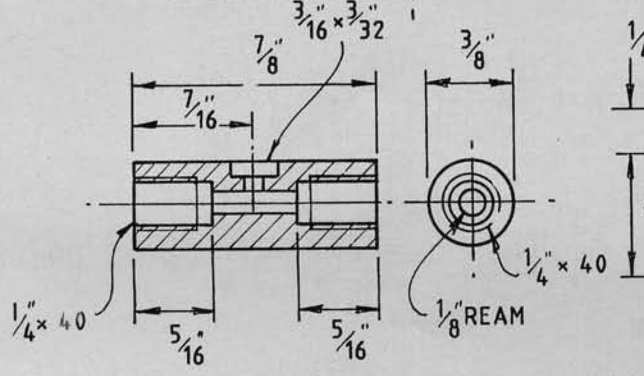
The two *Levers* are from 3/16" x 1/16" brass strip. Cut to length and drill as a pair with two 1/16" dia. holes as shown.

The *Piston* is either a piece of 1/4" dia. bronze or stainless steel faced to length with a 1/8" wide slot x 1/4" deep cut into one end and cross drilled with 1/6" dia. drill. Make sure that the outside diameter of the piston is a good sliding fit in the cylinder.

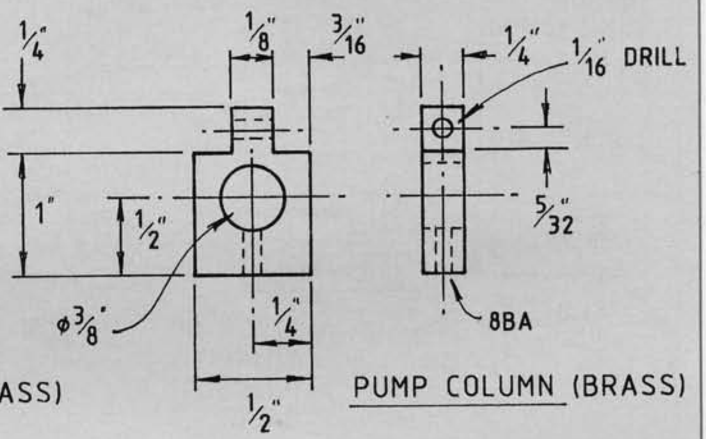
The piston, handle and the two levers can now be assembled using 1/16" dia. round head copper rivets pushed through and then lightly peened over to give a free action.

The *Gauge Body* is made from 7/16" A/F brass hexagon bar. Face, centre and drill 1/8" dia. x 1.1/8" deep. Turn the end down to 1/4" dia. x 1/4" long and thread 1/4" x 40 t.p.i. Turn the 3/8" dia. x 1/32" long section and part off at 13/16" long. Reverse in the chuck, face the end

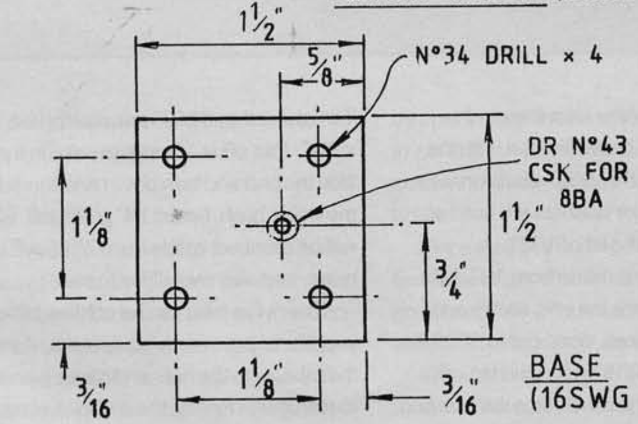




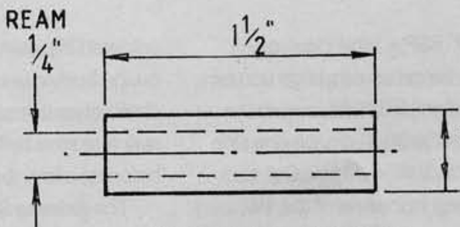
CLACK VALVE (BRASS)



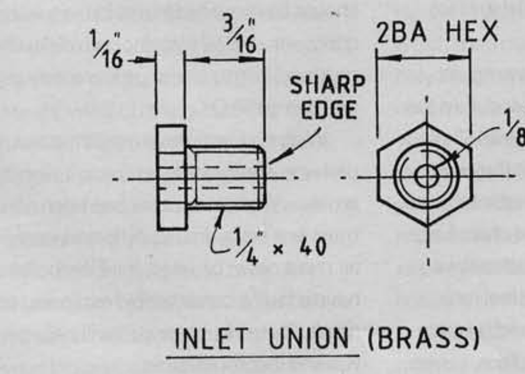
PUMP COLUMN (BRASS)



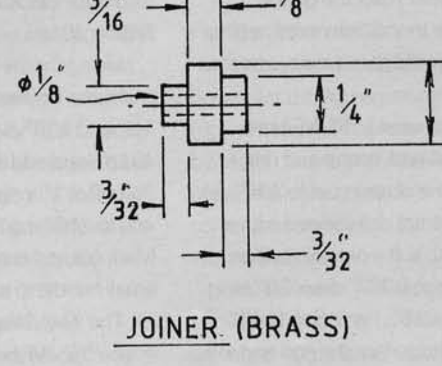
BASE
(16SWG BRASS)



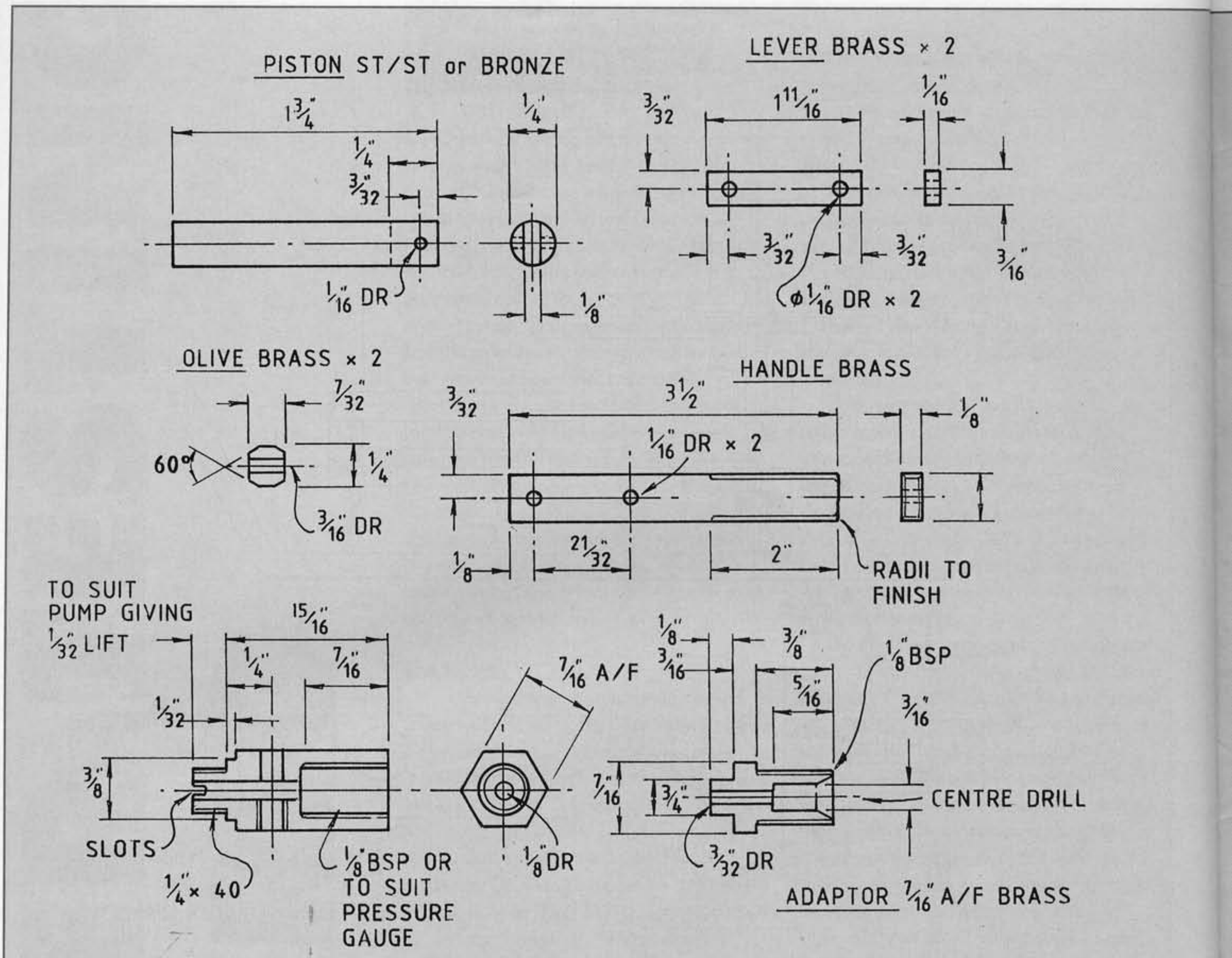
CYLINDER (BRASS)



INLET UNION (BRASS)



JOINER (BRASS)



and drill and tap 1/8" BSP x 7/16" deep or thread to suit whatever pressure gauge you be using. Mark out and drill 5/32" dia. across the hexagon, opening out to 3/16" dia. on one side and tap the other side 3/16" x 40 t.p.i. Cut two saw slots x 1/16" deep in the end of the 1/4" x 40 threaded end to prevent the 5/32" dia. ball from seating on the pumping stroke.

I would mention here that the gauge should read at least three times the working pressure of the boiler to be tested. Also, the gauge should not be smaller than 2" diameter, a 3" or 4" diameter gauge would give a more accurate reading.

The *Adaptor* again uses 7/16" A/F brass hexagon bar. Face the end, centre and drill 3/32" dia. x 3/4" deep and open out to 3/16" dia. x 5/16" deep. Now centre drill the end with a centre large enough to suit a pipe olive, then turn outside diameter to 0.383" dia. x 3/8" long and thread 1/8" BSP x 3/8". Part off to 11/16" long, reverse in the chuck, face the end and turn to 3/16" dia. x 1/8" long. This adaptor can now be assembled into the gauge body and silver soldered in position. After cleaning up, the gauge body can now be assembled with the clack valve, using another 5/32" dia. bronze or stainless steel ball. Fibre washers are used as before to allow the ball a lift of 1/32".

The *Release Body* is made from 1/4" A/F brass hexagon bar. Face the end, centre and drill 3/32" dia. x 7/8" deep, open out to 5/32" dia. x 7/16" deep and tap 3/16" x 40 t.p.i. Part off at 7/8" long, reverse in the chuck, face the end and turn 3/16" dia. x 7/32" long. Thread this piece 3/16" x 40 t.p.i.

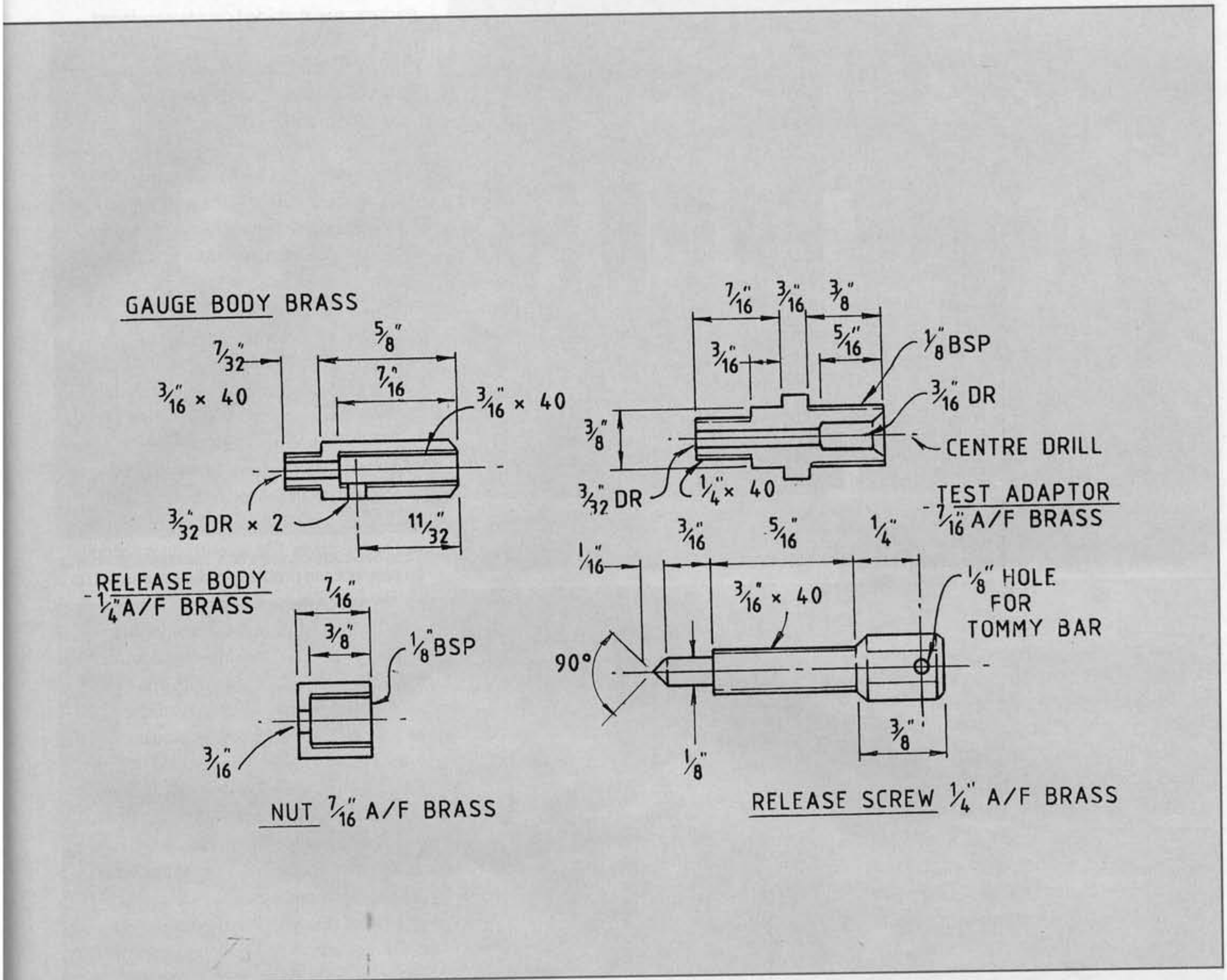
Using the 1/4" A/F hexagon brass again, make the *Release Screw*. Face the end, turn the 1/8" and 3/16" diameters, thread the 3/16" dia. x 40 t.p.i. and add the 90 deg. taper at the end. Part off at 1" long, reverse in the chuck, face the end to 3/8" long and form both end chamfers. Mark out and cross drill 1/8" dia. and make a small handle to suit from 1/8" dia. steel rod.

The *Test Adaptor* comes next and is made from 7/16" A/F brass hexagon bar. Face, centre and drill 3/32" dia. x 1" deep, open out to 3/16" dia. x 5/16" deep and centre to suit a pipe olive. Turn the o.d. to 0.383" dia. and thread 1/8" BSP x 3/8". Part off at 1" long, reverse in the chuck, face the end and turn down and thread to suit the boiler bush, I used 1/4" x 40 t.p.i. Two nuts will be required, made from 7/16" A/F hexagon brass, and also two olives to suit.

The nylon tube can be obtained from any supplier of pneumatic equipment. Assembly of the tube, with the nuts and olives is self-explanatory. Finally, the completed test rig should be mounted in a suitable tray or container - I used a plastic pate dish which I obtained from a major grocer many years ago and this is still OK.

Well, now you have made the test rig, perhaps a few words on using it won't go amiss. When your boiler has been completed it must first be hydraulically tested, compressed air must never be used, for if the boiler should have a fault a considerable explosion could result. By using water you will only get wet as water is incompressible.

Note: this test rig is only suitable for boilers which are constructed entirely from copper and



which have all joints silver-soldered. It is not suitable for any other boilers.

Using the Test Rig

You will need to make plugs for all the boiler bushes except the bush to which the nylon tube adaptor tube from the test rig will be connected.

Fill the boiler with water, leaving one of the bushes in the top of the boiler unplugged until it is full. Put your finger over this hole and gently rock the boiler to get all the air out, when you are satisfied this is done, fit and tighten the plug.

Gently pump the rig until a few pounds of pressure are showing on the gauge and then carefully examine the boiler for leaks. If this is okay, continue to pump until the gauge shows 20 p.s.i., examine this time for leaks and any bulges or distortion - also examine the firebox and fire tubes. If everything is still okay, then continue to pump and examine in stages of say 20 p.s.i. until you have reached twice the intended working pressure of the boiler. Leave it in this condition for a few minutes to stabilize.

Very gently release the pressure back to zero by opening the release screw. Note that it is important not to release the pressure too quickly because damage could be done to the boiler.

Repeat all of this procedure twice more, finally leaving the boiler at twice working pressure for 15 minutes, checking and letting pressure down slowly each time.

Do not be tempted to go beyond twice working pressure. It is not necessary and may result in internal over-stressing of the joints which may not actually show and may possibly only become apparent at a later date. You will now have every confidence when you take your latest creation to your Club or Association for their Boiler Testers to examine, test and give you a Test Certificate. Please note that you must not steam a boiler until a Test Certificate is issued. Self examination is just not good enough.

The boiler should be stamped with a number and date on a convenient place, never on the shell or side walls but preferably on the foundation ring or feet.

The pressure gauge and safety valve for the model should also be tested using the rig and by making additional fittings or adapters to suit.

Test Certificates issued by Clubs for all-copper, silver-soldered boilers will be valid for two years. When a re-test is due it must, again, be carried out by qualified Boiler Testers and this time it will be tested at 1.1/2 times the working pressure. Re-tests must then be carried out every two years after that. So good testing!

Further Information

For anyone constructing and/or testing boilers for model engineering projects, I would recommend the books on the subject written by Martin Evans and Alec Farmer. These are full of excellent good advice on the design and construction of boilers for models and are well worth reading.

You will also find that your local model engineering society members will be very willing to help out with advice and guidance on the subject of boiler making and testing. ■

EIGHT DAYS AT EASTER

by Kevin West

The heading photo shows the Imrex' 92 team posed behind Barchester (Midland Road) station on the upper level with the entrance to Winterbourne station in the foreground on the lower level. An underground train can be seen emerging from the tunnel.

It must have been said many times that however finely detailed a model locomotive is, whether it is 3", 5" or 7" gauge, it looks strange with a vastly over-scale driver towering over it as it steams around a track. And the train probably consists of two, maybe three, 'coaches' of vehicles carrying full-size passengers. To see a scale live steam locomotive hauling a representative train in a scale environment we must realistically look to where Model Engineering meets Railway Modelling. Examples of such are the layouts built and operated by the Gauge "1" Model Railway Association for display at the Model Railway Club's Easter shows in London. Kevin West gives an insight into the design, building and showing of these complex layouts and provides a few reminiscences from over the years ...

Why "Easter" in particular?

Had you been in Central London over the Easter holiday last year there could have been the possibility of bumping into a group of 30 or so green sweat -shirted people wandering about looking bemused and lost. Why? Well this group of the same 30 or so had spent the last nine Easters at the Royal Agricultural Society's Horticultural Halls in Victoria, and before that at the Wembley Conference Centre and the Methodist Central Hall opposite Westminster Abbey, manning and running the layouts displayed by the Gauge "1" Model Railway Association at the Model Railway Club's Easter Exhibitions, known as the IMREX. But times had changed and the 1995 show had not had room for a working Gauge 1 layout, only a static display had been possible, and this year there was no show at all. After so many years it was a case of "If it's Easter is must be the IMREX" - and then it wasn't!

So why did this group do it and what was involved? The answer to the first part of this question is easy - fun, with plenty of it over the run of the shows. The second part is not quite so easy but can probably be best summed up as hard work.

Before getting into detail of what was involved we should look into the background of the Association's IMREX layouts. The Association has been involved with the exhibition every year since its formation in 1947 with either static displays or working layouts. In the early years during the late 40's and 50's the layouts were only electrically powered, initially using either outside 3rd rail pickup and latterly stud contact. Following a demonstration to the hall management at the venue then used, an agreement was reached which allowed the use of live steam locomotives for the first time. At first only coal fired boilers were allowed, it was to be several more years before spirit and gas fired boilers were permitted to be demonstrated. The appearance of live steam was, and still is, a great 'crowd pleaser' and photos from these days show large crowds pressed against the barriers straining to see the action on the layout.

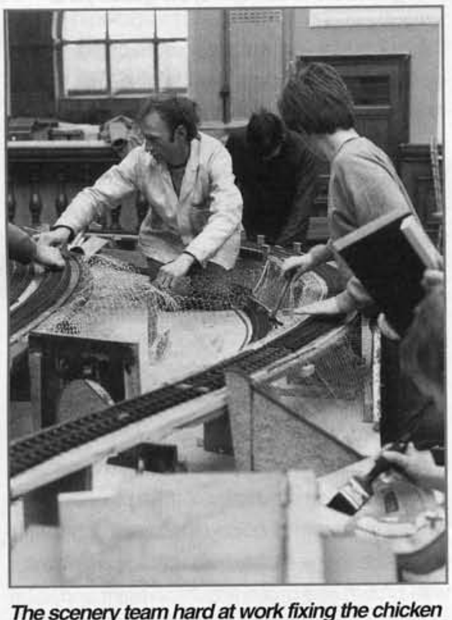
My own experiences of these layouts started at Central Hall in 1970 when, as a young spectator, I spent several hours watching an all electric branch line terminus layout called Winterbourne. In 1972 a layout known as the 'Dogbone' was shown. This was the largest layout built by the Association for the MRC's show but was probably the most operationally limited as it was basically a double track main line with a main station along one side with associated loops, carriage sidings and a loco depot for the live steam locomotives. A small goods yard on the outside of the main circuit was shunted electrically.

In the mid to late 1970's a smaller but more interesting layout appeared which was, in fact, the reincarnation of one shown several times in the 1960's at the Horticultural Hall.

Checking baseboard and track connections and levelling the rail joints with packing pieces.

This view from the elevated main control panel shows just how popular the layout is with the visiting public.

One of the bridges on the branch line being put into place and screwed down.



The scenery team hard at work fixing the chicken wire which will form the embankments etc.

A new layout for 1986

In 1986 the exhibition returned to the Horticultural Halls and the Association was given the opportunity to design and show a completely new layout. Within the size available, 42 ft. x 23 ft., was designed and built the best layout yet shown by the Association, or so we have been told by many spectators over the years. Operationally it has all the features required for showing Gauge "1" live steam and electric models to the full. The credit for this design must go to Francis Dobson, the former Chairman of the Association, who had designed most, if not all, of the Association's layouts and under whose supervision the layouts have been built and operated.

The layout comprises a double track main line running around the stand with a large main station (Barchester) situated on the curve at one end. Loops are provided for both main lines, one for the outer and two for the inner. The second loop from the inner line also doubles as the headshunt for the three-road goods yard, which is situated inside the main lines along one side of the layout, and also as the access road to the live steam locomotive shed on the other side of the stand. The outer loop has a siding off it serving a platform at which the local branch passenger services start and finish. These services also use the outer loop.

The branch line runs parallel to the main line along the side of the layout ,with both facing and trailing junctions, before separating away a little and dropping down the gradient across a viaduct and on towards a junction station. As the viaduct is crossed, tracks are visible on three levels - the main lines on an embankment to the rear, the branch line running down grade across the viaduct in the foreground and a low level line which can be seen through the arches of the viaduct between.

The branch junction station (Friars Bridge) is situated outside the main lines which are at a higher level behind a retaining wall. This station has two platforms, with the junction at the down grade end leading off to two single tracks. The inner branch line turns almost immediately under the main lines into a tunnel. This line continues, out of sight, under the main lines to emerge from another tunnel on the opposite side of the layout as the low level line by the viaduct mentioned earlier. The line continues curving to pass once again under the main line and finally enters a seven track enclosed fiddle yard, known as Effingham Yard, in the centre of the layout.

The outer branch line from Friars Bridge continues parallel to the outer loop of the main station above, but at a lower level, until it to dives into a tunnel under the main platforms. This line then continues out of sight around to the other side of the layout where a three track 'city type' terminus (Winterbourne) is situated.

Setting up the layout on site

So, after these brief descriptions of the layouts, how were they built and what was involved in setting them up at the show?

The system and construction used was first developed in the early days of the Association's involvement with the exhibition and comprises baseboards of 3/4" blockboard of various sizes and shapes up to a maximum of 6' x 4'. The boards don't have any framing and are supported on a Dexion framework built up on site. Once the framework is set up, the boards are laid on top and connected to each other by short lengths of 2" x 1" timber which are screwed through the blockboard across the joints. The trackwork is made up into standard lengths and radii much like the Hornby "00" track but with longitudinal battens under the sleepers. The track sections are screwed to the boards through the battens and wired up to surface mounted wiring runs. Across-board electrical joints are made by flying leads which have to be soldered up on assembly each year to pins on the mating board. All pins are numbered to eliminate connecting to the wrong pin!.

The chicken wire is now covered with plaster of Paris and allowed to set hard before painting.

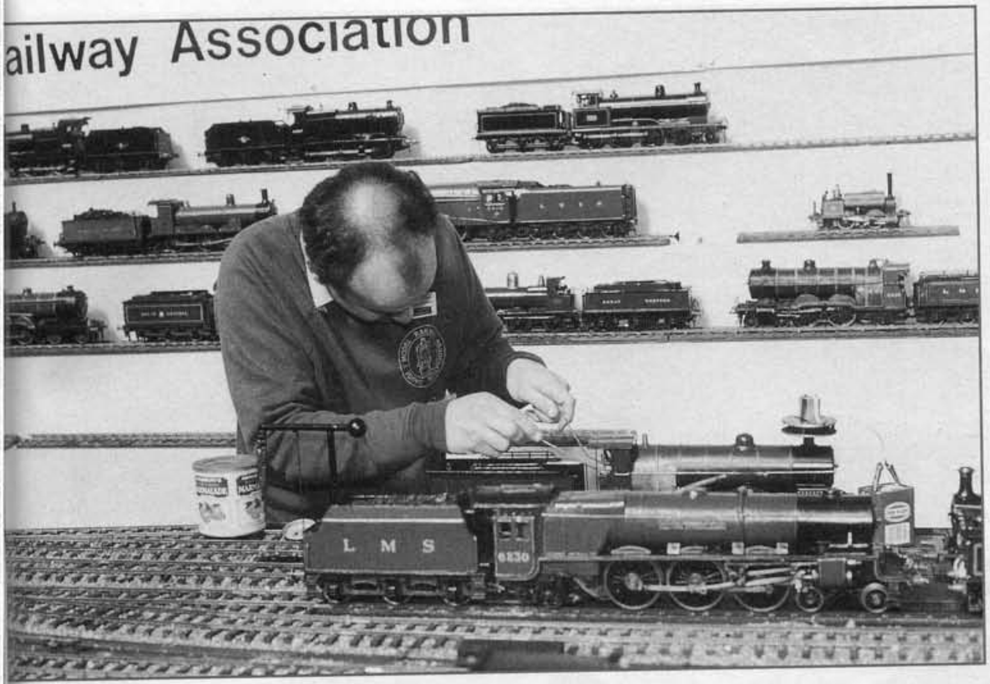
A view of the goods yard from inside the layout. The main steam running lines are to the right of the goods yard.

The control panels are equipped with plugs and sockets for the many inputs and outputs, supply to the layout going through a socket on master boards for further distribution by the surface mounted wiring described above. It is not only the track supply that is controlled electrically, there is also wiring for point motors, signal motors, signal lighting, water crane motors, and the inter-station block bells, telephones, track circuits, and acceptance lights. On the latest layout there are six electrical control positions, all of which require power for most of the above functions.

The electrical equipment used has changed over the years, electronics and miniaturisation have made their marks on the power packs and control panels. The Central Hall and Wembley layout had an enormous metal cabinet housing the power packs, track circuit relay packs and sundry other electrics. The main station control panel with all the track section switches, point motor controls and signal switches was mounted on the top of the cabinet on a sloping panel. The operators stood on a wooden plinth behind this cabinet which, with all the cables coming out of the back, looked more akin to NASA mission control than a model railway! It was known among the group as the "Mighty Wurlitzer". The replacement panel on Barchester is more complicated as regards the section , point and signal switches, but is simpler and smaller because the power packs are mounted separately and this has become known as the "Synthesiser'" in respect to its predecessor!

These two layouts, by their very construction, were very labour intensive to set up; with the Dexion frame to be erected, all those soldered joints to be made, circuits to be tested and faults traced and solved. During this testing someone would be on the control panel turning on each numbered switch in turn to test that what it was supposed to control was working properly. In amongst all the noise in the hall, and with the distances involved, it was quite common to hear "I said pull 47" as the next switch was tried, only for the point motor or signal motor not to respond. In later years the electrical team resorted to using hand held radios to talk to each other on opposite sides of the layout during testing.

Whilst the electrical team were checking their circuits, the scenery team would be preparing to build the hills and cuttings around the corner at the end of the layout. By now the low level branch line would be laid on the baseboard, with the branch and main lines on separate raised sections screwed into position. The scenery was made by stapling chicken wire to the track bases and then covering it with plaster bandage. Once dry it would be painted with brown and green emulsion paint and sprinkled with sawdust and foliage. With



The next main line driver is seen here lighting up his coal fired Atlantic so that it will be ready to leave shed on time for his train. The Duchess in the foreground is also a coal fired locomotive.

bushes, trees and bridge abutments in place it soon looked very realistic. Other scenic items were beginning to be placed in position, such as signal boxes, station buildings, signals and lineside huts.

Also, the screens around the fiddle yard would have been erected by this time and the "short straw" drawn to see who had the job of painting it all again. This was not the most popular job as not only was there a lot of screen to paint but, due to the limited amount of space inside the layout, it also resulted in many blue paint marks on clothing as people brushed up against the wet surface.

After two days work it is nearly all ready to show to the public, but not before one last big job - the track has to be ballasted with loose ballast chippings. Each yard is sprinkled with stone chippings which are then tamped down to below the sleeper tops to ensure that the electrical studs are clear because any ballast higher than the sleeper tops will lift the skate under the locomotives, break electrical contact and stop the train.

Layout operation

Once the show has opened the team switches from "build and test mode" into "operating mode". The team is split into two shifts, each working for an hour then having an hour's break. Each shift has electrical operators, who control the branch and empty stock trains, and steam runners. Several people on each shift will be able to cover both areas.

On the layout each shift would require up to four steam drivers, one electric operator in the fiddle yard, one at Winterbourne, two at Friars bridge, two at Barchester main control panel, one in the goods yard and a shunter/public liaison person who stood outside the layout to answer questions from the public and also couple and uncouple trains in Barchester Platform 1. All of these people would be under the overall supervision of the "Controller" who would liase between the various operators and the steam drivers.

The shunter at Barchester would often be so involved in talking to the public and answering their questions that catching his attention to couple or uncouple a train was very difficult. So a simple buzzer was set up which sounded on the outside of the layout when a button was pressed at the main control panel. This was known as the "Stan alert" after a similar device was used on the Central Hall layout where our former Secretary Stan Roberts set up almost permanent residence as the outside shunter. One year the regular buzzer at Barchester was replaced by an air raid warning siren device which, unbeknown to us, was very like the sound of the hall's door security alarms. For the first couple of days of the show, every time the "Stan alert" button was pressed the Hall's Security Guards would arrive to check all the doors in the locality until they realised what was happening!

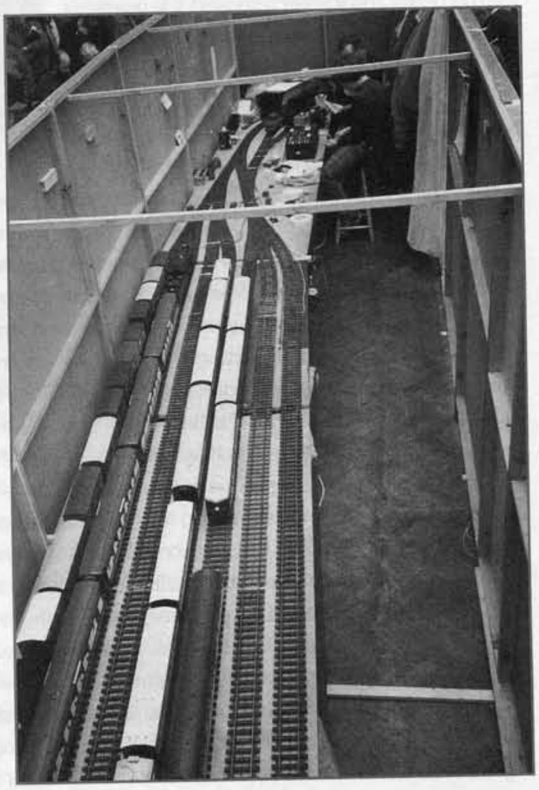
The "Controller"

The first time we displayed Barchester the main panel was mounted just inside the layout at baseboard height but space at that end of the layout was always tight, with the end of the fiddle yard just behind. So, the following year it was resited to be mounted across the top of the end of the fiddle yard, with the operators standing on a raised platform above the storage sidings. This gave an unrestricted view of the main lines for the main operators, but left them remote from the steam drivers with whom they had to liaise, hence the 'Controller' (either Fat or Thin depending on who was doing the job!) was introduced.

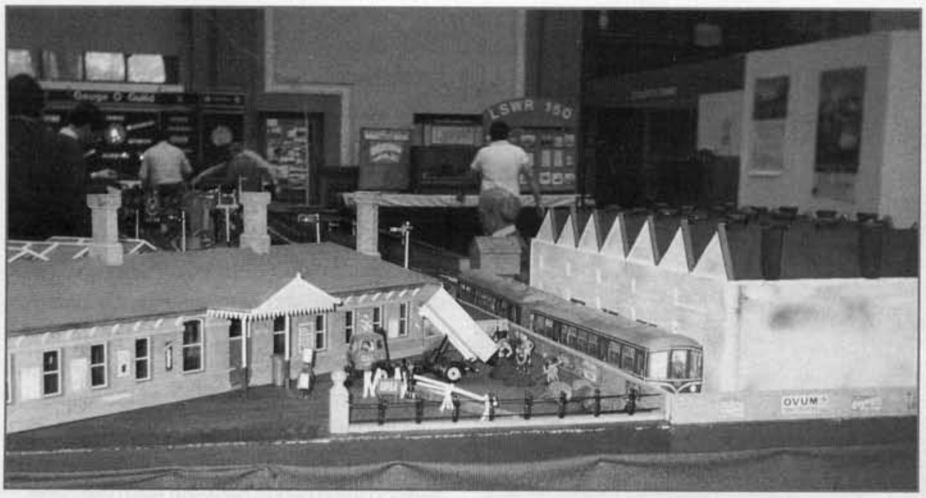
The main panel operator was the primary operator on the layout and he would decide how the train movements should be made and in what order. The Controller was the link, relaying information between the main panel and the steam drivers for such things as when the next change-over of steam locomotives was going to happen or when the steam drivers had to stop to allow an empty stock train, or a trip goods that was leaving or arriving in the goods yard, to cross the main lines. The Controller and main panel operator were linked by head mounted two way radio sets. This radio link was very useful both for its intended role and also for passing the unending banter that continued throughout the show by the team. When taking over the main panel from a previous shift who had got in a right mess with their train movements, comments such as the following were quite common:-

"Have you seen where we got a goods train?" - Answer: "In the electric loco shed!"

"Where have all the electric locos gone?" - Answer: "In the goods yard" or "In steam loco yard!"



A bird's eye view of the fiddle yard.



(Above) The entrance to Barchester (Midland Road) as seen by the public, with the engine shed on the right and a DMU in the siding.
While the main control panel operator scratches his head and wonders what to do next! (Right) the controller watches a down goods go over the crossover and the main line steam driver tends to his loco (Below).

And - "How did they get that in there?"

Other messages often heard over the headsets included such as:-

"Opposite the turntable, blue top" or "By the goods shed, blonde", which shows that the two-legged female models were being studied as much as the two-railed type!!

Running the live steam locomotives

The steam runners are given permission to run continuously on the main line by the main panel operator . The double-slip points which form the throat pointwork at each end of the station are locked by key switches, so that once the road is set and the key removed, the points cannot be changed. These keys are fitted to a chain loop which, when given to the steam driver, acts as a "token" for permission to proceed with his train. For the points to be changed, the key has to be regained from the driver, inserted in the panel and then the switch can be operated. In practice it works very well.

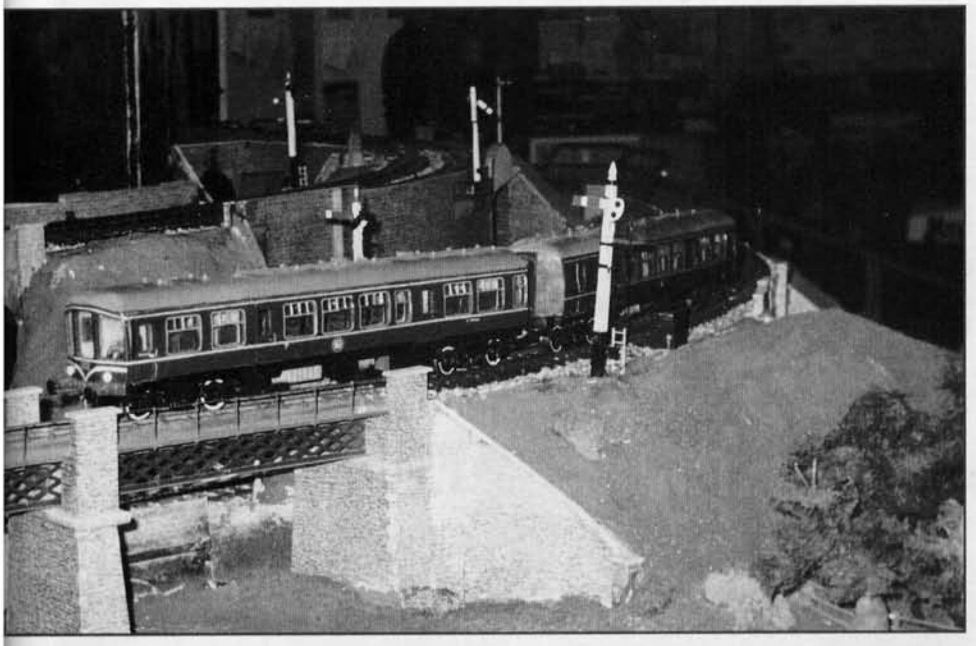
Meths fired engines normally run for three quarters of an hour, with coal fired engines getting an hour. This usually allows the change-overs to be staggered thus allowing a changing display of different engines for the public to watch during the day. Each train will run with matching appropriate rolling stock, so not only does the locomotive have to be changed, but also the stock as well.

Empty stock for the new steam runner is made up according to the timetable for the day and will leave the fiddle yard about 10 minutes before it is required. Hauled by a suitable electrically-powered engine, these heavy trains travel via Friars Bridge junction and up the stiff gradient to Barchester main line station on the higher level.

If the stock is to used, for instance, on the outer main line it will be run into the outer loop and the electric locomotive uncoupled and run forward into the headshunt. The new steam locomotive will by now have been raising steam in the loco yard and, when ready, will be given permission to run around the innermost loop and wait at the end for the signal to cross the main lines and join his train. The Controller will then ask both inner and outer main line drivers to stop their trains and the platform starter signals will be set against them. The key "token" will be taken from the outer driver and inserted in the control panel ready to deal with the stock presently running on the outer main line which has to be worked down the branch to the fiddle yard. The second main panel operator will have positioned an electric loco at the top of the branch and, when the retiring outer runner has stopped, the points will be changed and the electric locomotive run on to the back of this stock. The train will be "belled down" to Friars Bridge and sent as soon as accepted.

Whilst all this is happening, the retiring steam locomotive has been uncoupled from its train and run forward clear of the pointwork allowing enough room for the new engine to run out behind. With the points set and the signal cleared, the new runner crosses from the inner loop to the outer main line and then reverses into the outer loop to couple to his train. The retiring loco then runs back across the main lines into the inner loop and then on to shed to extinguish his fire and clean down the engine.

With the empty stock off down the bank to Friars Bridge, the points will be reset for the main line and the loop starter cleared for the new runner to proceed, being given the key "token" as he passes the control panel. Once



With the scenery finished, painted and detailed, a DMU is run up the branch line to test out the electrics and the track circuits.

Several hands are needed to fit the "Golden Spike" - the last baseboard joint on the layout.

the train is all on the main line the loop starter signal is returned to danger, the crossover at the end of the loop is set to normal and the main line signal cleared to allow through running. The main line signals are worked automatically by track circuits.

An inner line change is similar except that both main lines have to be stopped to allow the new empty stock to cross into the inner loop before the main change-over can take place. At times there would be a double change-over when both main lines changed locomotives and stock at the same time. Depending on the operators on the main panel and the branch stations, and if the new steam locomotive runners were ready on time, a double change-over could take anything from about four minutes (if every thing went smoothly) up to about ten minutes if things went wrong or there was congestion down the branch!!

"Fun and Games"

The block bells sometimes caused confusion with the less experienced operators, one of the most common problems being the operators either ringing the wrong codes or misinterpreting the codes. Imagine being offered a Multiple Unit Train (code 3-1-2) from the next station, but have no room to accept it. So you return the code for "blocking back" (code 3-3) which means "I am full up and will not accept your train". Next thing you hear is 2 beats on the bell ("Train entering section") and it suddenly appears on the track circuit lights. The sending station has mis-heard your 3-3 code as 3-1-2 and sent the train on its way, even though you have not switched on the accept light! That would often put you in a real spot if your station was full and you also had a train standing on and blocking one of the single lines.

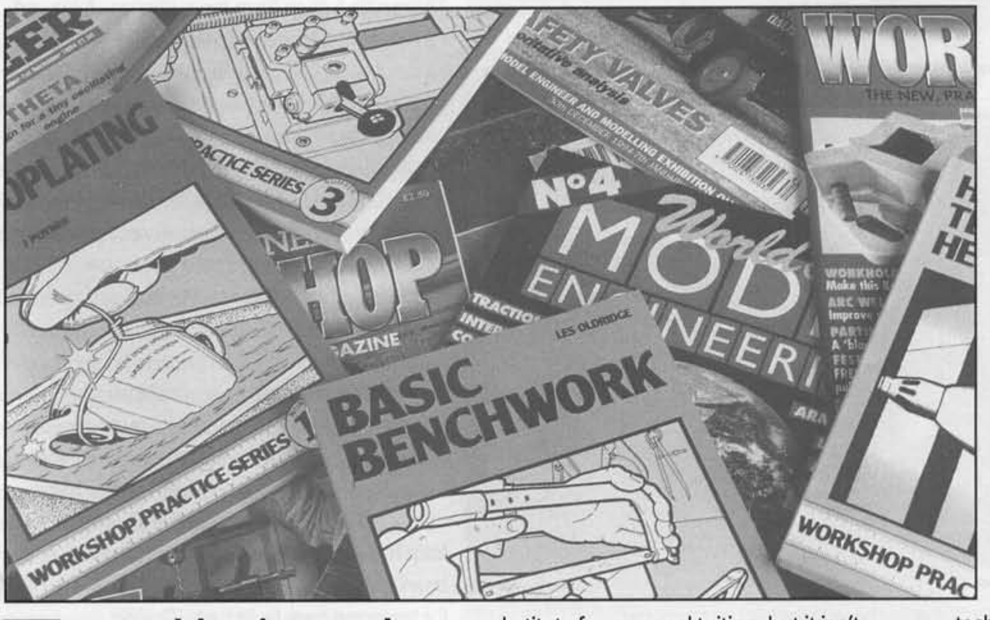
During our time at Central Hall, one of the most memorable moments was produced by an incredible coincidence. The late Dave Cole was running his Bassett-Lowke LNER Flying Scotsman with a heavy train of teak coaches. Now, a Gauge "1" train is not silent in its operation and, as the train was running at speed, the noise coming from the exhaust of the engine and the clatter of the coach wheels on the track joints and pointwork are as near to those on a full size railway as you can get in a model. The "Scotsman" was running well and at a good speed when somehow the front bogie of the locomotive derailed on some pointwork, the clattering of which could be heard over the rest of the train noise. Immediately after the pointwork, the track entered the right hand curve around the end of the layout and, as the locomotive entered the curve, the driving wheels also derailed increasing the noise - until the locomotive came into contact with a signal with a solid thud. There was a gasp from the audience - followed by a deathly silence which lasted for only a second or two. Then, from outside the Hall, the silence was broken by the two-tone horns of a passing emergency vehicle. The crowd then audibly breathed out and laughter filtered around the layout. Luckily little damage was done, though I think the signal came off a little worse for wear, and the train was soon circulating once again.

All Over Too Soon!

All too quickly the last day of the show arrives and, when the announcement comes over the public address that the show is closed, the work of setting up the layout all has to be done in reverse. Just four hours after the last train has run, the whole layout will have been dismantled and loaded into the lorry for transport back to its base. During dismantling, the scenery - built just a few days ago - will be torn off the layout and thrown away, with just the chicken wire retrieved for re-use next year. Items lent by individual members will be packed in their own cars and, as the team members come from all parts of the country, some will have already departed on their way home leaving those hardy (or mad) enough to follow the lorry back to base and then unload it all again. If all goes well, at around midnight it will all be stowed away in the garage and we will be sitting down to a pizza and a welcome cup of tea, to reminisce about the year's show and possibly suggest some improvements that can be made for next the year. Then its back to the cars, drive home, into bed, and dream, Can it really all be over for another year?, ... block bells ringing 4-1, ... 4F and goods train on main line, ... "Your on the main panel next shift, o.k?" "Yes please" ■

BOOKS & PUBLICATIONS for the beginner

by Adam Harris



Every model engineer needs reference sources for workshop techniques and information to help build the models. Adam Harris makes some suggestions for books to start the beginner's bookshelf ...

As a newcomer to model engineering, you've started assembling your workshop and made your choice of lathe. It is sitting there gleaming in it's new home, you've twiddled the handwheels and switched the motor on and off a few times when the realisation slowly dawns that you are none too sure what to do next. At this point you have three choices:-

(1) Get stuck in - and hang the consequences. Not recommended - as whilst you may survive, will your lathe?

(2) Buy some books and read what to do.

(3) Find someone who knows what they are doing, to guide you.

Of the options, (3) is the best as there is no substitute for personal tuition, but it isn't always possible or convenient. If this is the case you should seriously consider option (2) which is assembling a library of books for guidance and reference. The main specialist booksellers advertise regularly in *Model Engineer, Model Engineers Workshop* and *Engineering in Miniature* magazines and a good starting point is to contact the booksellers and ask for their latest lists. You will quickly realise that the range of books available is very large but the following hints, tips and suggestions may prove useful in choosing the right titles.

A first basic rule is not to buy books which are too advanced; they'll scare the heck out of you and you will probably end up buying the simpler book you would have bought in the first place anyway! Secondly, whilst you will need some "core" reference books - covering items such as drill and tap sizes - in my view it is best only to buy books on one subject at a time, logically starting with lathes and lathe work, and then moving on to different subjects as you need them. Thirdly, ignore the publication date of books you find listed - many have been in print for years, or indeed reprinted, and the techniques and tooling used by model engineers are largely those in use fifty or more years ago.

Unfortunately there is no such thing as one all-embracing "Beginners Guide to Model Engineering" in print, although *The Amateur's Workshop* by the late Ian Bradley comes close. *Shop Theory* (originally published by the Henry Ford Trade School in 1941 as a contribution to the war effort) is also worth considering but, being aimed at apprentices in industry, covers some machines and techniques the amateur is unlikely to need to use.

Basic "core" books can be selected, as and when needed, from the excellent *Workshop Practice Series*, published by Nexus Special Interests, and *The Model Engineer's Handbook* by Tubal Cain, from the same publisher, should be on very beginner's bookshelf.

Books on Machine Operation

In this writer's opinion, the best books on lathes and lathework are *The Amateur's Lathe* by Ian Bradley and How to Run a Lathe from the South Bend Lathe Co. Both are full of good, solid and easy to follow information; the latter in particular you will probably keep near your lathe and refer to for years to come. *Lathe Operations*, originally published in 1937 by the American Technical Society, describes certain critical and often used lathe machining operations very simply and this is a good follow-up book. It is one of a worthwhile series also covering milling machines, planers, shapers, laying out etc.

By the time you have mastered the lathe, and are considering buying other machine tools, you really are no longer a beginner, and what you have learnt on the lathe will stand you in good stead when you have to learn to use other machine tools. For this reason, no specific book suggestions are included here for other machines, but rest assured that you will not be lacking in choice!

Other titles which the beginner will find useful are: *Working Sheet Metal* by Dave Gingery which explains very clearly the principles of laying out metal and working it; *Metal Spinning for Craftsmen*, Instructors and Students, reprinted from 1936, and an excellent book on the fascinating technique of spinning metal; and *Vise Work*, reprinted from 1908, which may be old but contains useful and difficult to find information on working metal with chisels and files.

As his experience increases, the beginner may find making his own tools an enjoyable way to practice his new found skills and there are a number of books covering this, either in compendium form or on individual machines. For building machine tools, books by the father and son team of Dave and Vince Gingery are hard to beat and Model *Engineer's Workshop Manual* by the late George Thomas is a tremendous compendium and also a joy to read, as are the three books in the *Machinist's Bedside Reader* series from Canadian author Guy Lautard.

Books on Models

So far we have concentrated on books about machining techniques, but there are also a considerable number of books available on building specific models - stationary steam and petrol engines, aero engines, hot air engines, traction engines and railway locomotives; if it coincides with that you wish to build, the right construction manual can be a great confidence booster. The subject choice is too great to mention individual titles but there are a number of authors who have been prolific in this area, and sometimes also on workshop techniques, any of whose books are worth considering. In no particular order these include Stan Bray, Martin Evans, Henry Greenly, "LBSC", "Tubal Cain" (Tom Walshaw) and Edgar Westbury from the U.K.; Elmer Verburg, Rudy Kouhoupt and Philip Duclos from America; and Kozo Hiraoka, writing in English, from Japan.

Other Information Sources

Another useful source of information for any beginner are videos, but currently the choice is somewhat limited, although the veteran American writer Rudy Kouhoupt stars in a series on various aspects of lathe-work and milling which were produced with the beginner in mind.

Any newcomer to model engineering should read the three magazines mentioned at the beginning of this article, as they are mines of useful ideas, hints, tips and contacts. Other English language magazines to try are *Live Steam, Modeltec, The Home Shop Machinist and Projects in Metal* from America; and Australian Model Engineering from down under.

Model engineering is a great hobby and a lot of fun. Learning the skills involved in working metal is very satisfying. The books and magazines mentioned here, and the 100s more also available, will help the beginner to get started in this most fascinating of hobbies.

Happy reading ..... and happy machining!

List of useful contacts

Book Sellers and Publishers:-

Brandbright Ltd, The Old School, Cromer Road, Bodham, Holt, Norfolk NR25 6QG
Tel: 0126 370755

Camden Miniature Steam Services, 13 High Street, Rode, Somerset BA3 6UB
Tel: 01373 830151

Meridian Clocks, Wheelwrights, Hillgrove, Lurgashall, Petworth, Sussex GU28 9EW

Nexus Special Interests, Nexus House, Boundary Way, Hemel Hempstead, Hetrs. HP2 7ST Tel: 01442 66551

TEE Publishing, The Fosse, Fosse Way, Radford Semele, Leamington Spa, Warks. CV31 1XN Tel: 01926 614101

Model Engineering Societies:-
Society of Model & Experimental Engineers, Marshall House, Wanless Road, London

Information on your local clubs may also be obtained from the following -

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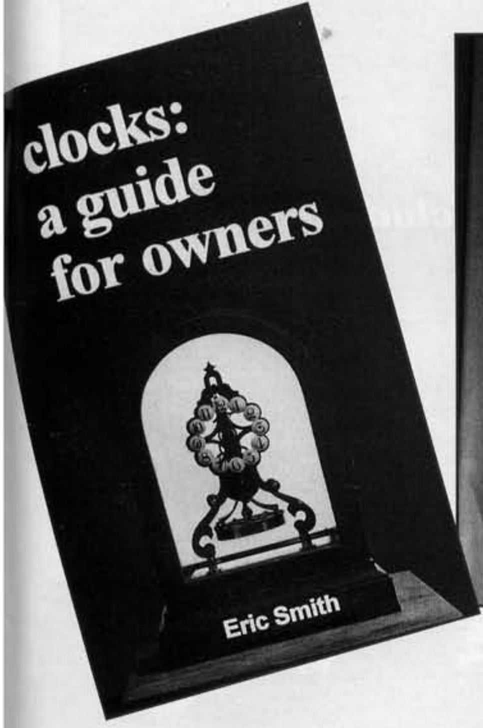

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