REVISED MODULAR

STANDARDS

or

How to build a Module!

INTRODUCTION

This document has been produced to provide assistance and guidance to members of the Yorkshire Area Group to build modules in N gauge that will easily join up with those of other members.

It also contains additional information to help members lay track, wire up modules, and carry out basic scenic work to produce a standard module which can then be 'customised' as the owner sees fit.

The format of the guide is a series of 'data sheets' each covering a different topic.

In each topic there are a series of headings:-

Mandatory – requires that the standards outlined in this section MUST be met on the module to allow for compatibility with other modules. In certain cases modules must be brought to group meetings for some jobs to be done by others – such as the fitting of the track alignment pieces on the end of modules.

Optional:- this is information that illustrates either an optional standard or reflects practical experience gained from operating modular layouts. Whilst not compulsory, builders of modules are strongly advised to consider possible problems if this advice is not followed.

Notes:- additional information that may of benefit to the builder.

Only about a third of members of the group have modules. It may be quite off-putting to new members to see the standard of some modules and think 'how can I do that?' – the answer is very simple. We all had to start somewhere, and only by practice can we improve – so don't be afraid to 'have a go'. There is a wealth of experience and talent in the group, which members are more than happy to pass on to others. So help is available in a whole range of topics from woodwork and electrics to track laying and scenery. Just ask!!!

With this in mind a list is provided at the back of the guide of members who have specific skills/knowledge in certain areas.

Before you start

You should have some basic ideas about a module before you start – such things as:

Will it be scenic (4 tracks running across the front in a scenic setting) such as a farm scene, or river bridge or town scene; or will it be operational with tracks coming off Track 4 into a station or serving an industry?

A rough track plan will be useful, especially if you intend to use points as these will affect the position of cross-bracing under the baseboard.

A series of sketches/notes are included at the end of the guide of existing modules to help give some idea of the possibilities for modules.

BASEBOARDS – GENERAL DIMENSIONS

Mandatory:-

Boards to be 4’ long or multiples of 4’

Boards to be rigidly constructed to retain shape when moved

Ends must be 4” deep, vertical and smooth

Inside of frame to be kept clear for full width to allow for G clamps to be fitted to join boards together

Legs with cross supports should be set in from the board ends so they do not affect clamping of boards

Height of the board should be 36” to the top of the track.

Legs should have +/- 2” adjustment in height to allow for uneven flooring

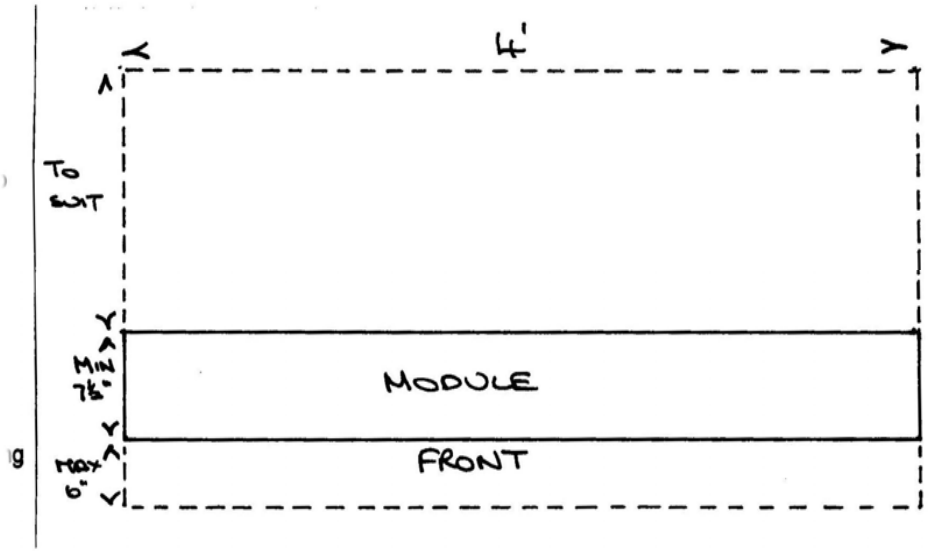
Optional:-

Boards may extend outwards for 6” maximum (scenic only to allow building of embankment, cutting etc.)

Recommended board widths are 24” maximum, and 7” minimum

Inclines to be kept to a minimum on four through tracks

Boards should be painted to protect the wood, preferably a dark green colour to match existing boards. The most commonly used is Johnstones quick dry satin (for interior wood and metal) ‘Green Glen’ from ‘Boyes’ or similar stores.



Notes:-

Boards may be made of any suitable timber or sheet material but it is important to remember weight – plywood is recommended.

TRACK PLANNING

Firstly it is important to distinguish between 2 types of modules. A module with just four tracks running across the board is known as a 'scenic module'. A module with points (turnouts) coming off Track 4 to serve an industry or similar is known as an 'operational module'.

Mandatory:-

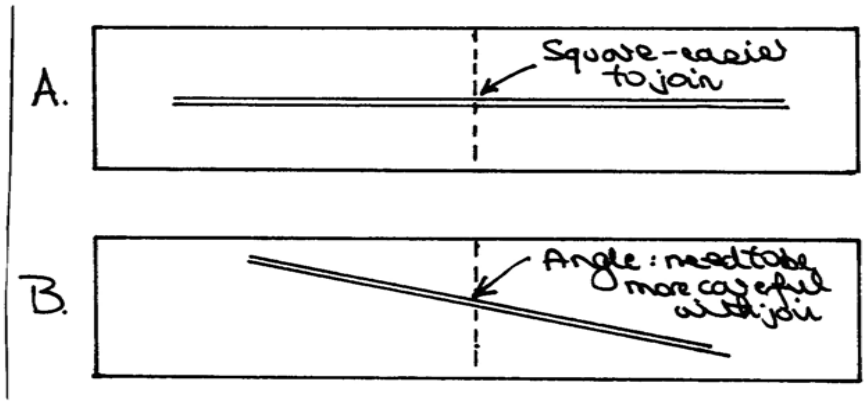
In a modular layout system models from several different countries will need to run through your module. So whereas small radius points and sharp curves may be fine for small tank engines or diesel shunters, they are not be suitable for long wheelbase US locos, 85' autorack cars, or close coupled passenger trains like Eurostar, Thalys or Japanese multiple units. So, medium radius points and gentle curves are needed (large radius even better!). Similarly the loading gauge for trains varies from country to country. So, what might be the correct height/width for bridges, platform canopies, tunnels etc for one country is different for others. To allow US autoracks (car carriers) or 'double stack' container trains which need much more clearance, it is advised that the minimum height for bridges, tunnels etc is 1.75".

Notes:-

If you are only intending to build a 'scenic module', then you can ignore this section and move on to page 4.If you wish to have an operational module with points (turnouts) coming off track 4 to serve an industry or for a station or similar, then it is worth drawing up a rough track plan first. This will allow you to plan the position of points, length of sidings, position of electrical feeds and so on.

If you would like to have an 'operational module' but are unsure of how to plan it out, then members will be more than happy to give help and advice. Publications are available to help in book and model shops, examples include: - :
PSL Book of Model railway Track Plans by C J Freezer
Simple Model Railway Layouts by T J Booth

You may find that a 4' x 2' module is a bit limiting for an 'operational module' so a double module (2 x 4' x 2') may give more scope for what you wish to do. Certainly it would be better if you wanted to model a through station for example. You would then need to consider how you were going to align tracks between your 2 modules. You do not need to use the group end pieces between your 2 modules (although you can if you wish), but you must make sure that the tracks will run through smoothly. A number of methods are available and in use by group members – all involve laying track across the join and then fixing the rails to immovable objects such as small screws or pcb strips; and then cutting the track with a razor saw or a slitting disc in a mini-drill (try to remember not to melt the sleepers!). One hint that can be given is that it is easier to get reliable joins if the tracks are square rather than at an angle (see diagrams below)



You may notice that some members with operational modules have boards that bolt on to the front of modules with 2 tracks. These worked very well with the old 3 track system, but with four tracks when they are bolted on Track 3 would run right down the join! As you will see, these can still be used, but members using this system will have to have add-on boards to make the 4 tracks achieve the correct spacing (see David Milburn's 'Fox River' modules).

TRACK SPACING AND BOARD ENDS

Mandatory:-

Before any track is laid, any track underlay you wish to use (cork etc) should be glued down. Boards should be brought to a group meeting to have fibreglass end supports fitted at each end of a module, and holes drilled to allow boards to be correctly aligned using dowels.

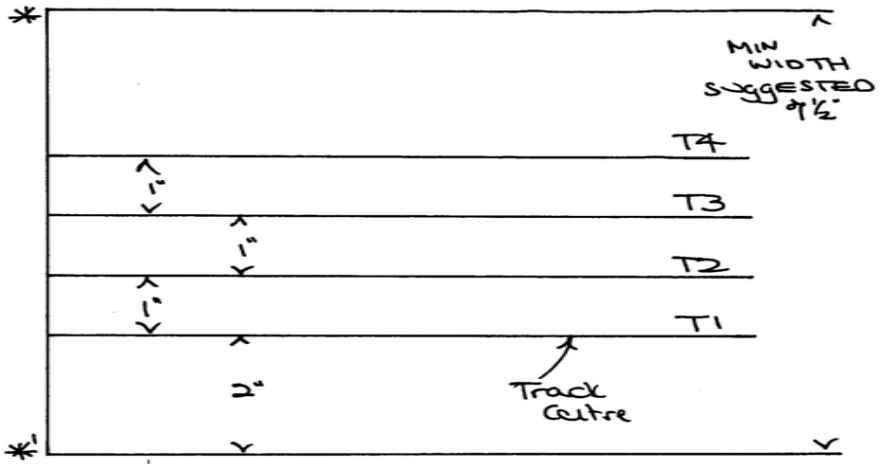
Track to be used on four main running lines is Peco Code 55.

Track centres are 2", 3", 4" and 5" from the front edge of the board.

Tracks should be brought to board ends, and the rails fitted into the slots in the fibreglass strips and then cut flush with the end of the board.

Notes:-

it is advised that additional wooden pieces are bolted on to protect the ends of modules during storage/transport.



Bolt-on fibreglass strip for module and rail alignment, fits on the board edge between * and *1

TRACK LAYING

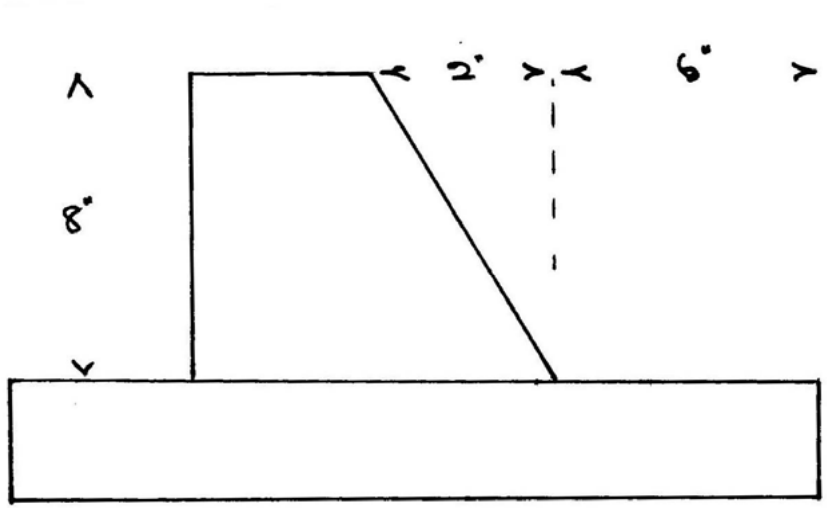
Notes:-

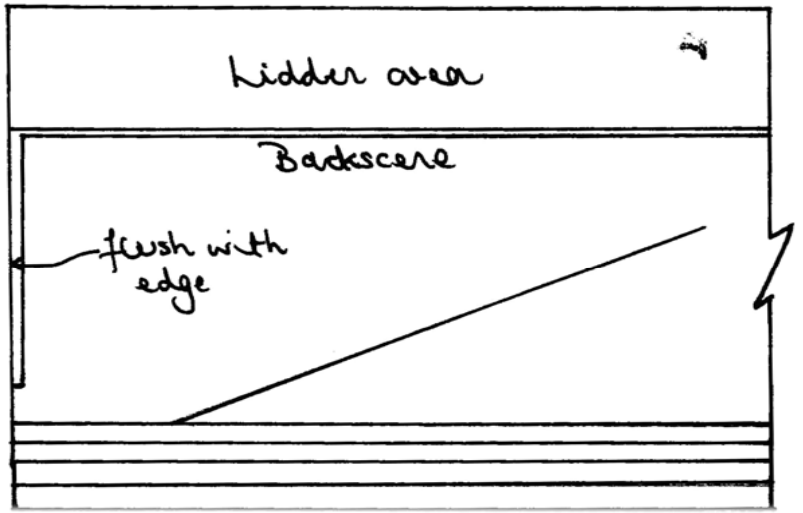
Before you start to lay track, it is worth considering electrical wiring. It is easier (and less unsightly) to solder wires to the underside of the track before you lay the track, than it is to solder wires to the sides of the track when it is laid. The only thing you will have to remember is to drill holes in the baseboard to take the wires from your pre-soldered track.

Track can be fixed down to the baseboard in a number of ways – glued down using PVA glue or similar; double sided carpet tape, or lightly pinning using pre-drilled holes in sleepers are just some of the alternatives. When the track is ballasted, this will usually hold the track in place.

The module should normally be wired up and tested for electrical operation (including points), before ballasting (see later notes on electrics).

BACKSCENES





Mandatory:-

It is NOT mandatory to have a backscene on a module.

Optional:-

A backscene height of 8" above track level is recommended. Above that height, operators taking trains through a module have difficulty observing the train.

Backscene to be of suitable rigid material (eg. 6mm ply) No supports to be visible.

Backscene to be flush with the end of the module edge. If fastening to the edge, the backscene thickness must run the full width of the module to leave a flush edge and the thickness taken into account when building the module board.

Hidden areas may be created at the rear of the module.

Side backscene to start 6" from the front of the layout and have a 4 in 1 slope. Top corner to be slightly rounded

POWER TO THE MODULES!

Control of model railways in whatever scale is now in the hands of 2 systems both of which are used by the group at meetings/exhibitions on the same modular setup.

***DC:* -** this is the original method of layout control still in use by many people. This is basically 12V DC applied to the track with one train running on it. If you want to run another train, you have to put the first into a siding, switch off the power and then switch power on for the second train. At meetings/exhibitions we normally use Tracks 1 and 2 for DC operation. The fiddle yard has three tracks for each of Tracks 1 and 2, and normally 1 train will run around the layout on each of the tracks. When the points are changed in the fiddle yard the power to each of the tracks is switched off so only one train can run at once. All but one British outline N gauge locos come ready-to-run on DC power; also most Continental, Japanese and US outline.

***DCC or Digital Command Control:* -** this is the newer method of control (first started by Hornby in the 1980s with their Zero 1 system; but now much more sophisticated). With this system a constant 16V AC is fed to the track and all tracks are fed from the same supply (no sections or switches etc). To avoid locos running off in all different directions each one is fitted with a 'decoder' a small package of electronics that can be programmed by the user to accept individual commands. The simplest of these is the 'address' (usually the loco number) which is simply fed into the hand controller and can be individually controlled. Leave it running and diall up another loco and off it goes! In other words control is through individual locos (or groups of locos known as consists) so multiple trains can be running on the same track (and also in opposite directions, but let's not go there just yet!!).At meetings/exhibitions we normally DCC control on Tracks 3 and 4. This is mainly because those members who are taking trains off track 4 into their modules, at present have DCC setups; but there would be no reason at all why we couldn't use Tracks 1 and 2 for DCC and Tracks 3 and 4 for DC. DCC fitted locos are most commonly available in US outline, but also increasingly in Continental. There is no reason at all why locos cannot be converted from DC to DCC – there are a number of members who can help with this.

Whilst DCC is more expensive than DC and would be even more expensive if you were to convert a large DC collection of locos – if you are starting from scratch DCC should be a serious consideration.

DC Power supplies and hand controllers are provided by the group for operation of the layout, though if you were to build an 'operational' module with tracks off Track 4 you will need to provide your own power supply and controller. As there is a wide choice here, advice is available.

DCC power supply is provided by members and the group has settled on the use of the **Digitrax** system for the group layout. Other members use the Lenz, ZTC and Fleischmann systems (although not with much success in the case of the last mentioned!). There is not much to choose between in terms of these systems, it comes down to a matter of personal preference, but there are some systems on the market which are not as good as others; and if you are thinking of going down the 'DCC path' then please ask for advice before doing so. The advice given when looking at DCC is to look at, and if possible try out, before committing yourself to one company or another.

Points (turnouts) on the layout are all electrically controlled – on the DC and DCC fiddle yards points have Peco point motors and controlled using electric pencil and studs method on a centrally placed panel. On the endloops the points are Fulgurex and are changed by selecting a point using a rotary switch and then pressing a button to activate. In both of these cases multiple points are changed to select 'routes' rather than individual points. Some members with DCC modules have DCC controlled points which does away with panels. Points are chosen by number and a button pressed on the DCC handset. The only problem here is that individual members should make sure their points have different addresses than those of other members to avoid what the Americans call 'cornfield meets'!!

ELECTRICS

Mandatory:-

Connections between boards are made using audio (phono) plugs and sockets. A 4-way socket board should be fitted at the rear of each end of the module set about 8" in from the end of the module to avoid wires getting trapped when modules are bolted/clamped together. These 4-way sockets are provided by the group (free!) for new module users.

4-way joining leads are also provided by the group.

Each socket/socket carries the power for one of the four tracks with a centre and an outer connection. There are four tracks on the module at 2, 3, 4 and 5 inches from the front of the board. These are referred to as Tracks 1, 2, 3 and 4 respectively working from the front of the board. The rails are also numbered to allow correct connection. On track 1 the rail nearest the front of the board is Rail 1, and the next is Rail 2. On Track 2 the rail nearest the front of the board is Rail 3 and so on up to Rail 8.

The rail nearest the front of the layout for each track is wired to the Centre pin of each plug, and the second rail to the outer of the socket. So the full sequence is:

- TRACK 1 :Rail 1 goes to Socket 1 centre
- TRACK 1 :Rail 2 goes to Socket 1 outer
- TRACK 2 :Rail 3 goes to Socket 2 centre
- TRACK 2 :Rail 4 goes to Socket 2 outer
- TRACK 3 :Rail 5 goes to Socket 3 centre
- TRACK 3 :Rail 6 goes to Socket 3 outer
- TRACK 4 :Rail 7 goes to Socket 4 centre

TRACK 4 :Rail 8 goes to Socket 4 outer

The sockets at the rear of the module are each placed so that Socket 1 (Track 1) is nearest to the edge of the module with Socket 4 (Track 4) towards the centre. So when viewed from behind the module the arrangement at the left of the module will be Track 1 – 2 – 3 – 4 and at

In addition to track1 being connected to Socket1, the sockets at each end of the module should be connected together – so Socket 1 left wired to socket 1 right (centre to centre and outer to outer), Socket 2 left to Socket 2 right etc so that we do not rely on the rails to complete a power circuit.

You should use heavier duty wire for wiring the sockets together (16/0.2mm) and lighter wire (7/0.2mm) for feeds to the track.

Modules should be brought to a Group meeting to be checked and tested to ensure that they have been done correctly and will work with other modules. If you are not sure then the modules can be wired up at a Group meeting.

Optional:-

It is also recommended that you use different coloured wires for different purposes to help in fault finding. At the simplest 2 colours (for example RED for Rail 1, 3, 5 and 7 and BLACK for Rail 2, 4, 6 and 8).

Some members do not rely on rail joiners at all and so wire each separate piece of track to ensure electrical continuity.

Point wiring is slightly different and is covered later in the guide.

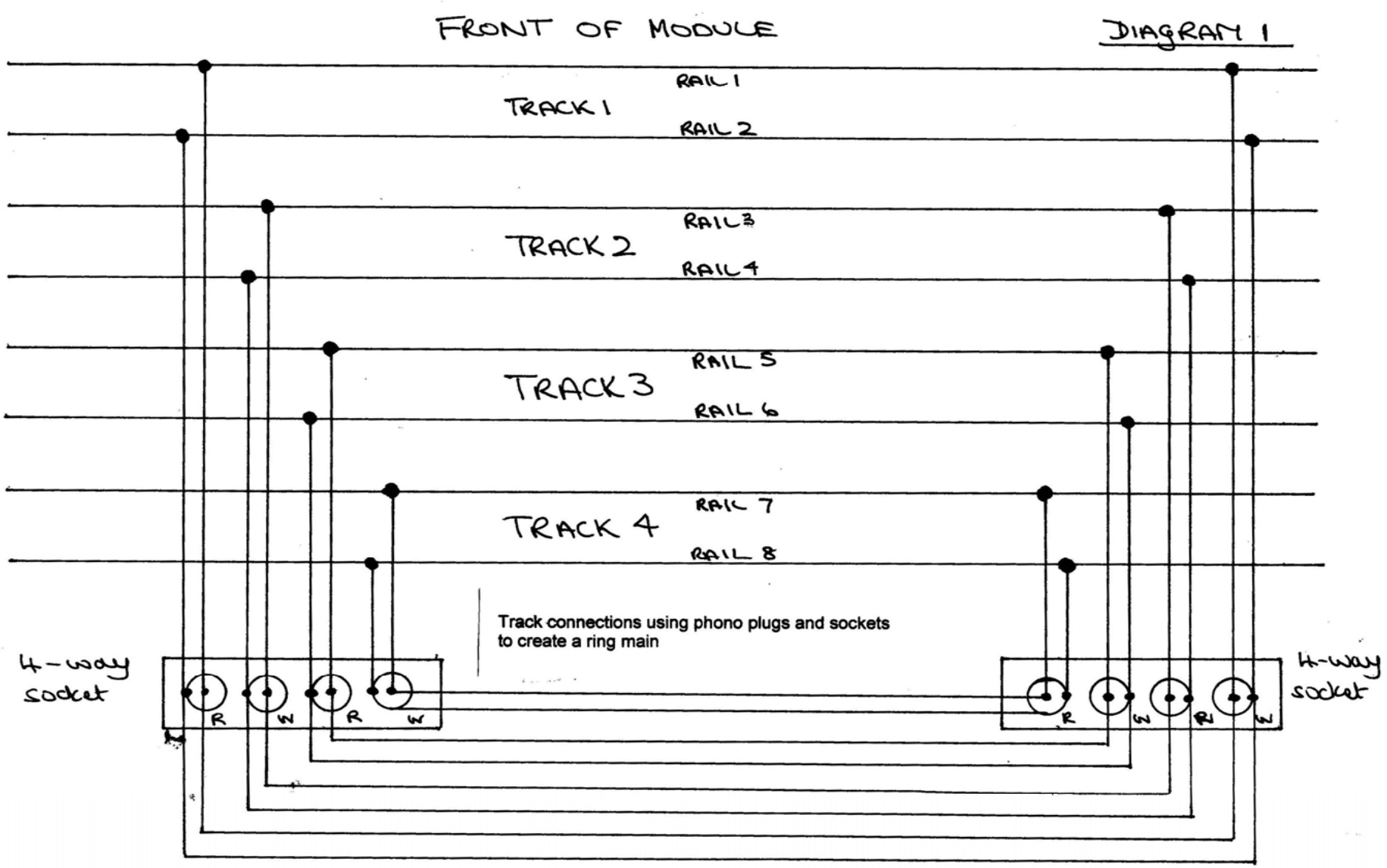
The above wiring standards apply to both DC and DCC operation

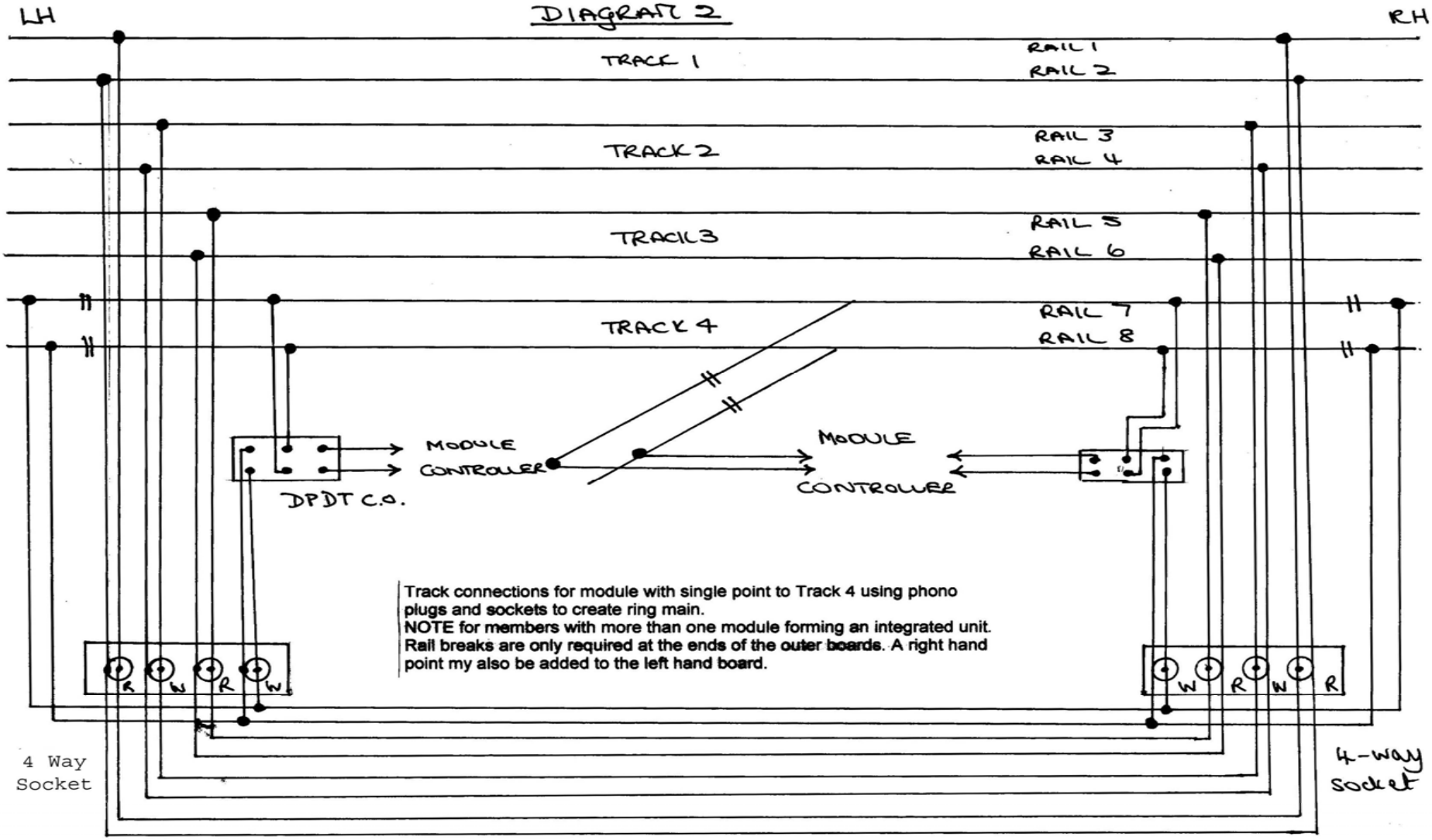
Wiring Diagrams

Two diagrams are provided:-

- Diagram 1 shows wiring for 4 through tracks (a 'scenic module')

Diagram 2 shows wiring for 4 tracks with points coming off track 4 (an 'operational module'), If wiring for DCC then the rail breaks and DPDT switch are not needed – all tracks leading from the point can simply be wired into the same circuit as Track 4.


FRONT OF MODULE
DIAGRAM 1
RAIL 1
TRACK 1
RAIL 2
RAIL 3
TRACK 2
RAIL 4
RAIL 5
TRACK 3
RAIL 6
RAIL 7
TRACK 4
RAIL 8
Track connections using phono plugs and sockets to create a ring main
4-way socket
R
W
R
W
R
W
R
W
4-way socket


LH
DIAGRAM 2
RH
TRACK 1
RAIL 1
RAIL 2
TRACK 2
RAIL 3
RAIL 4
TRACK 3
RAIL 5
RAIL 6
TRACK 4
RAIL 7
RAIL 8
MODULE CONTROLLER
DPDT C.O.
MODULE CONTROLLER
Track connections for module with single point to Track 4 using phono plugs and sockets to create ring main.
NOTE for members with more than one module forming an integrated unit. Rail breaks are only required at the ends of the outer boards. A right hand point my also be added to the left hand board.
R
W
R
W
W
R
W
R
4 Way Socket
4-WAY Socket

BASIC SCENIC TREATMENT

So, you've built your board. Laid the track wired it and had it all tested. You can now run trains with other modules, but it doesn't look right yet. There are two basic tasks you need to carry out so that it 'looks OK'. These are ballasting the track and some simple scenic dressing on the remainder of the board to cover the bare wood.

Ballasting the track:-

There are a number of ways of ballasting track; many depend on personal preference, but the 'raw materials' are basically the same. The following is an outline of one method used successfully by some members of the group.

So what do you need?

- Ballast. How much obviously is determined by the size of the area. (Woodlands Scenic Fine Ballast Gray Blend (B1393 is number for large container) is the standard ballast for the group).

- Glue. One bottle of Woodland Scenics Scenic Cement. This does not need to be diluted and is used straight from the bottle.

- Surgical Spirit. This can be bought from any pharmacy and is not expensive. A 200ml bottle at Lloyds is less than £3 and goes a long way.

- Eye dropper or similar tool. I use some larger clear plastic squeegee tubes for the glue usually bought from the tool tables at model rail shows (e.g. Squires). Also medical syringes could also be used.

- A selection of brushes for spreading the ballast. Artists brushes are my preference especially one with a large flat head (Size 12) although you need smaller ones as well. But you don't need expensive brushes.

So how is it done?

- Pour the ballast roughly where it is needed directly from the jar or using a funnel or spoon to deliver it where required.
- Using the large brush head I then gently sweep and dab the ballast into place. I find the large brush head leaves a reasonably even appearance to the ballast without forming ridges or grooves. Finally a smaller brush is used to clear ballast from any point, track surface, etc. I don't bother about trying to clear ballast off the top of sleepers. Apply ballast to the whole of the area to be covered. This is the longest part of the job but probably the most important.
- Now working in blocks - use the eye dropper; deliver a drop or two of surgical spirit to every sleeper. This has the effect of washing off ballast left on the sleeper but the spirit, being so fine, soaks quickly right into the ballast and acts as a wetting agent for the glue. You will notice the wetted area spreads rapidly. This is normal so don't panic. but do ensure all the area to be done is wetted before glue is applied. (Don't wet too large an area at once or it will dry out before you have finished).

Before applying the glue always ensure that the bottle is given a really good shake as the contents do separate on standing. I forgot to do this first time I used this glue for scenic work.

- Using a different dropper if available begin delivering the glue in small drops to the wetted area. While it is still wet (it changes colour when wet). You will notice that the wetting agent really draws the glue deep into the ballast forming a really good bond. (If you apply this glue without the wetting agent it just sits in globules on the surface and does not get drawn in).
- Repeat the process for the remainder of the sections.

The spirit will evaporate fairly quickly leaving a firm bond throughout the ballast and it will dry overnight under normal conditions and the glue is not visible to the eye. Although it dries firm it is not brittle and is easy to remove with a small chisel or similar implement should the need arise.

Happy Ballasting!!!

PAINTING THE TRACK

Newly laid track has a very shiny metal track, and obvious 'plastic' sleepers. Painting can be a very laborious process if carried out by hand – such as painting the rail sides with a rust coloured paint, and painting the sleepers a 'weathered' colour. Colours are available from suppliers like Phoenix Precision paint, Railmatch or Humbrol.

Phoenix: P977 Track colour (rusty rails)
P979 Track colour (weathered sleepers)

These come in small tinlets (15ml) for £1.95.

However, not all track looks the same, and probably a better (and certainly quicker) method, is to get the P961 sleeper grime in an aerosol (150 ml) for £4.95, and lightly spray the whole track area This tones down everything rails, sleepers, and 'dirties' the ballast.

When finished make sure you thoroughly clean the tops and inside edges of the track to allow for good running.

Basic scenic dressing:-

This is just to cover the remainder of the board (or until you decide what you are going to do on the main part of the board) or the area around the track. Basically, it just involves gluing down some 'scatter' material which comes in a wide variety of colours. These come from a variety of sources – Javis and Woodland Scenics are the most commonly found in model shops; or you can make your own by dyeing sawdust. The latter is not as common nowadays, as a bag of scatter can be bought for about 99p. It is advisable to get a range of colours and mix them to get a more realistic 'look'. Application is simple – put a thin layer of PVA glue across part of the board that you want to cover, and then sprinkle the scatter (sometimes called 'flock') across the glue – darker colours like black/browns nearer the track, and greens away from the track. It doesn't matter if they overlap, as this helps to 'mix' them. Make sure the glue is fully covered and then gently 'tap down' with your finger. Then move onto the next patch and repeat. more glue onto any patches which haven't worked and add the nicely mixed residue that you have collected!

Bushes and larger areas of vegetation can be glued down using Clump foliage or foliage clusters from Woodland Scenics or coloured lichen which can be bought in bags from model shops.

Most of us now use Woodland Scenics products - they are much more widely available and very good quality products.

Website addresses:-

http://www.phoenix-paints.co.uk/

http://www.howesmodels.co.uk/

http://www.javis.co.uk

http://www.woodlandscenics.com/

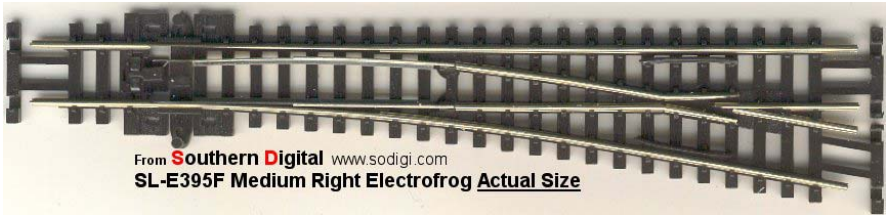
POINTS (TURNOUTS)

Firstly some terminology; I have always known them as points (and always will!), but a much more commonly used term now is 'turnouts'. There are two basic types of turnouts; Power Routing (a.k.a. all live and live Frog), and Non-Power Routing (a.k.a. insulated Frog and non-live Frog). Peco makes both types under the names of ElectroFrog and InsulFrog, respectively. InsulFrog are only available in Code 80.

You will be using Code 55 'ElectroFrog' points on your module, but it might help to show the difference between the two:

plastic frog

This is easier to wire up, but some small wheelbase locos (the Graham Farish Class 08 diesel shunter being the best example) often have problems crossing the all plastic frog.



all metal frog

This is more complicated to wire up, but gives much better running.

It is much better to have some method of switching points by electrical or mechanical means rather that using the 'big hand from the sky' especially at exhibitions.

Mechanical methods include –'wire-in-tube' – literally what it says – a wire in a brass or plastic tube, with the wire attached at one end to the point and the other to a lever or handle of some sort at the rear of the backscene. Kits for this are marketed by a number of firms such as GEM Mercontrol.

Electrical methods involve using a 'point motor'. There are a variety of these in use within the group, but basically fall into 2 groups:-

Solenoid motors such as Peco and Seep which fit under the baseboard with a pin which fits into the hole in the point tiebar. These are the most commonly used, but points change instantaneously when power is applied are very noisy in operation.

Slow motion motors such as Tortoise, Fulgurex and Lemaco. These again fit under the baseboard, but are larger, more expensive but silent and points change more prototypically.

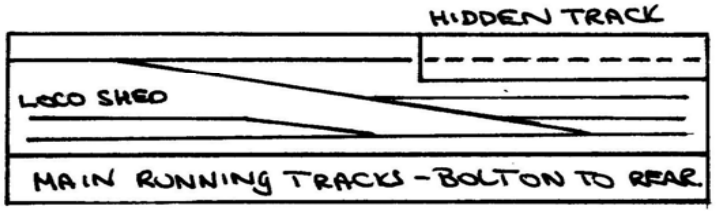
The main problem with points is that they need to be cleaned regularly If dirt gets between the point blade and the running rails, then the electrical connection can get broken – and there is no power to the track. It is therefore, recommended that the points are wired to change polarity. This involves soldering 3 wires to the point and taking them to a switch. The slow-motion motors already have the switch built in, whereas a separate switch has to be bought to fit to the Peco point motor.

The group fiddle yards have Peco point motors and switches to change the points and switch polarity; and the group endloops have Fulgurex motors; so that you can see both in action before deciding what you will use. Help is always available to members to wire up points, no matter what system you choose to use.

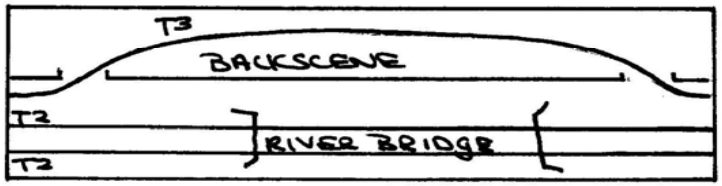
MODULE IDEAS Based on existing group modules

Single 4 foot modules – Scenic

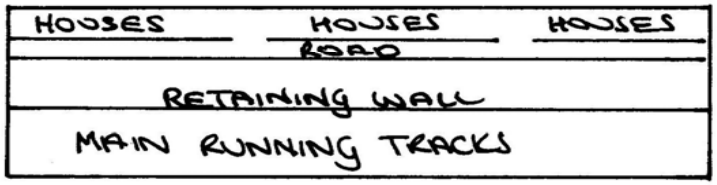
Geoff Armitage ; US outline engine depot



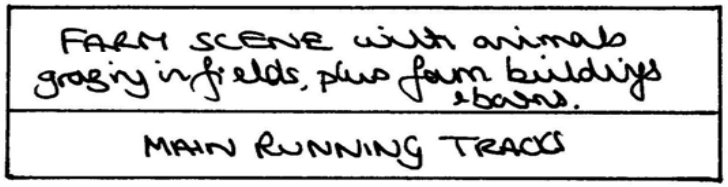
David Guy : bridge over river with 3rd track out of sight



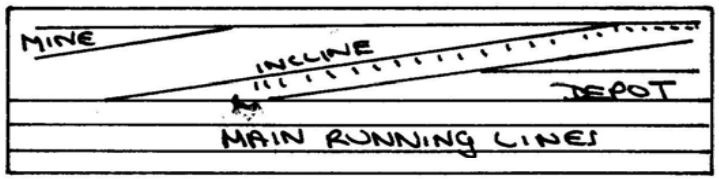
Doug Carroll : British scene with townscene on raised section at rear



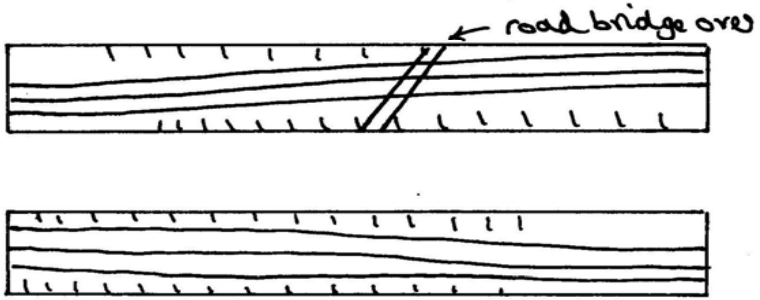
Peter Hetherington ; British farm scene



David Milburn : Orll Mine – US outline with mine on raised section

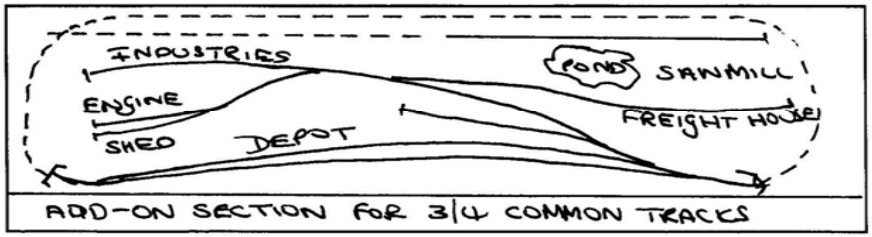


Andrew Ward/Mike Burden ; pair of deep cutting scenes

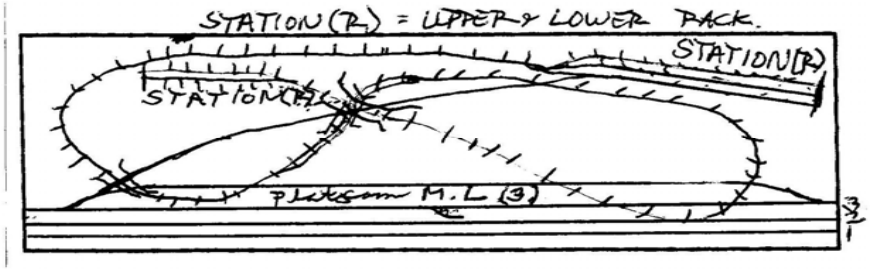


Larger modules—Operational

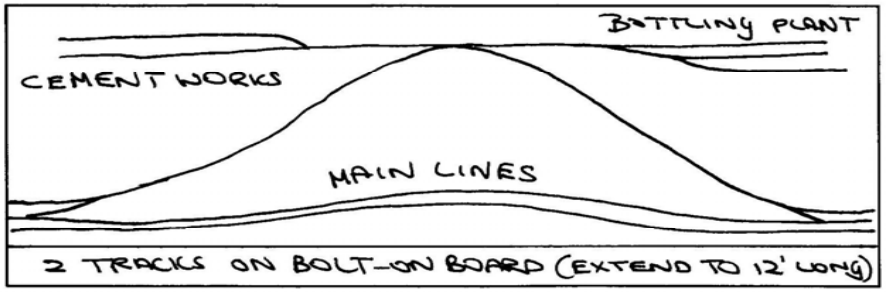
David Guy : Fawkesburg (8' x 2')



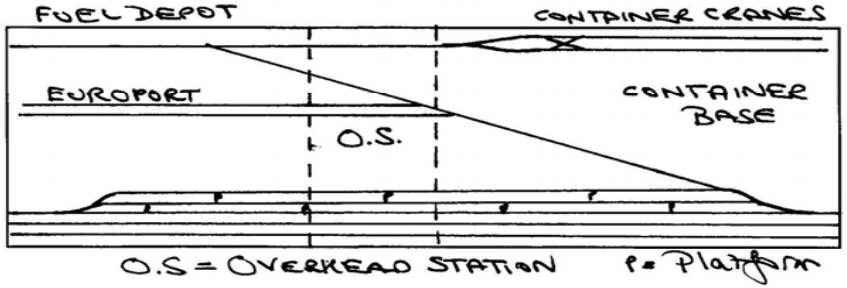
Brian Raeburn : Swiss outline with rack railway (4' x 1'9")



David Milburn : Fox River (10' 6" x 2')



John Pagdin : Eurotunnel (12' x 2')



John Brady (20' x 2')